INSPIRING INVENTION THROUGH STORIES

PROGRAM HANDBOOK

Making LITERACY-INNOVATION CONNECTIONS for Rural Public Libraries and their Youngest Patrons

An Initiative of the *Young Innovators Project*

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Part 1: Program Implementation

Chapter 1: Introduction, Approach and Guidelines

This chapter will introduce you to the Literacy-Innovations Connections project, funded in part by the Institute of Museum and Library Services (IMLS) and Syracuse University. It will provide you with some background on its origins, share the literacy-innovation connections approach and offer some guidelines for implementation.

A Brief Background

The Literacy-Innovation Connections Project (also referred to as *Inspiring Invention Through Stories*) is designed to support both literacy and inventive thinking skills in young children (grades K-3). It is particularly important that programs targeting this combination of skills be made available to the youngest patrons of public libraries in rural areas.

Rural communities across the United States face significant challenges, such as the lowest employment and economic growth rates, and lower educational attainment, that impact their potential for innovation. Additionally, many rural areas struggle to provide families with the support and resources needed to promote childhood literacy (Columbia University, 2017) that is essential to engaging in information seeking to solve problems and innovate. According to a report by the American Library Association (Real & Rose, 2017), rural libraries can help their communities through services and programs. Children from rural areas need to begin to develop their innovative thinking skills starting from an early age so that they are better prepared to tackle the issues that challenge their communities and contribute to future economic growth as adults.

This project extends the work of our previous IMLS-funded project, "School Libraries as Innovation Spaces, Librarians as Innovation Mentors: Stimulating Students' Curiosity, Inquiry and Innovative Thinking" (aka the "Young Innovators Project") and its nationally recognized web-based resource called *The Innovation Destination (TID)*, created by the same project team and launched at the 2017 November Conference of the American Association of School Libraries (AASL). The program described in this e-book brings exciting new audiences to TID, expanding from school libraries to include public libraries and rural communities, adding K-3 young innovators to its current grade 4 – 8 database of video resources, and extending the all-innovation content to include the important literacy connections and skills required for innovation creation. Additionally, the literacy aspect of the proposed project incorporates lessons learned from an exploratory project piloted in rural Pamlico County, NC called *My Little Home Library,* a program focused on promoting reading interest and family engagement through its interactive after-school reading and nature-based activities. Each week, children went home with a new hardcover storybook to help children build their own little home libraries. *My Little Home Library* included a strong family literacy component which has been carried into the *Literacy-Innovation Connections* project. A family

literacy component acknowledges the positive impact that parents can make on children's attitudes toward learning and literacy when they take an active role in these types of activities.

The Literacy-Innovation Connections Approach

At the core of this approach is the power of story and of story structure. Ken Haven, author and librarian, defines story as "a detailed, character-based narration of a character's struggles to overcome obstacles and reach an important goal" (2007, p. 79). His definition includes all the elements of a good story from the character(s) with an intent or goals, to the actions and struggles of those characters, or as children learn, the "problem" in the story that must be solved. Stories have rich details and settings that help make the story come alive. The characters in stories don't even have to be human or even a living thing but *characters drive stories*.

Stories can be a bridge from the familiar to the unfamiliar making them ideal as the starting place for learning new content and skills such as those related to innovation. But, what is it about stories that make this so?

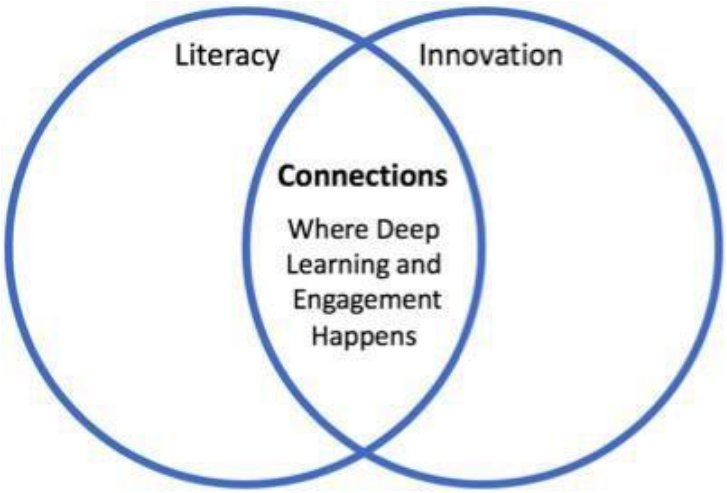
What makes stories so effective beyond their engaging qualities has to do with "story structure" also known as "story architecture." You have been hearing about story structure since you were a small child. When we teach young children about story structure, we begin with a simple approach; stories have a beginning, middle, and ending. Children quickly progress to thinking about story elements including Setting, Characters, Plot/Problems, and Solutions. Sometimes, we call them story maps, or as a pre-writing help aid, we often call them story plans.

What is most significant is that storytelling is among the most effective ways to improve literacy. Literacy not only includes reading and writing but also listening, speaking, and communicating -- all of which are practiced when using stories. Children move from listening and reacting to stories to telling stories orally, through drawing stories, and later through writing and even digitally producing stories. What's more, through stories, children can expand their understanding of other cultures, of others' unique differences (and their own), and develop empathy.

Because we are hard-wired in terms of story structure, using story helps to provide a needed context for new learning. In the Literacy-Innovation Connections

project, some of the new learning comes in the form of problem-solving using the Engineering Design Process and inquiry skills, and often through STEM-related content. The suggested books for the weekly program sessions have been selected because they inspire innovative thinking. Some are fictional stories, while others are informational texts or true stories such as biographies.

Pairing literary and informational texts is also an excellent strategy for improving literacy but most of the library sessions described here will afford only enough time for one or the other to be included. For each session, the suggested books will be natural tie-ins to the inventive thinking activities. By forging connections between the literacy and the inventive thinking challenges, deeper and more meaningful learning can happen and children become immersed in problem-solving.



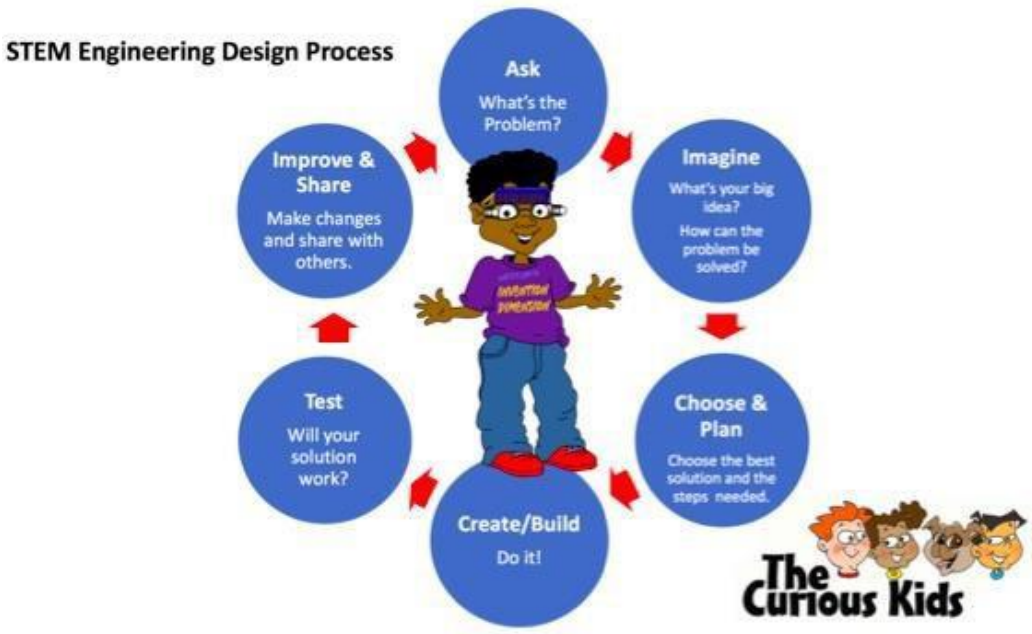
Curiosity Creek: The Weaving Thread Through the Program Sessions

In addition to the suggested read alouds that stimulate thinking about innovation, there is another literacy component that provides continuity from week to week, helping to tie together all of the sessions. Each suggested read aloud incorporating literacy strategies (see guidelines later in this chapter) will lead to the problem-based story scenario set in Curiosity Creek. Curiosity Creek, an online resource designed to stimulate inquiry and creativity involves fun characters and settings which provide the week to week weaving thread. Children are challenged to help solve the problems encountered by characters they come to know. It will take innovative thinking (and the steps used in the engineering design process from identifying problems to finding and testing ideas) to come up with solutions.

The mission of Curiosity Creek is to stimulate inquiry and imagination in young children, especially in the context of learning about nature and their environment. You can visit the official site at curiositycreek.com. The setting embraces the "community" of Curiosity Creek and includes Mac's (Information Detective) treehouse office, a tiny rural

public library, the Curiosity Creek Elementary School, the Marshlands, an art gallery, the Curiosity Creek Clubhouse, Itty Bitty Kitty's place, the fishing dock, and several other venues. This natural, coastal community serves as an anchor, yet adventures may sometimes take the characters into new settings and uncharted territory--into cities and even new countries.

One diminutive yet dynamic character, Teenie Genie, makes exploring outside of Curiosity Creek a real possibility. Children will enjoy the ensemble of characters who live around Curiosity Creek, a lovely rural community where families enjoy spending time outdoors. There are four Curious Kids who act as our main characters and are always exploring and discovering new things. And Hector, one of the Curious Kids from Curiosity Creek, fancies himself as one cool inventor. Often there are problems to solve and the kids participating in this weekly library program are asked to help!



The problem-based story scenarios are fairly short in length and each one includes an illustration to help children visualize the situation. Elements of story structure are further reinforced in these situations as children think about the characters (and their special traits) and the settings involved in each scenario. Children must identify the "problem" to be fixed in order for the story to have a successful outcome.

While some story scenarios are shorter than others, here's an example of one that is a bit longer along with the illustration. Each of these illustrations is made available in the resource section of this PDF book for your use (e.g., coloring pages to take home).

Session Plan Title: "Bucket of Junk" by Katherine McGinnis

The Problem-Based Story Scenario:

It's a rainy day in Curiosity Creek and the kids are looking forward to Tanisha's art opening tonight. They decide that she may need help setting up so they decide to join her. However, on their way the ground suddenly starts shaking! What could it be they wonder? Hector's wheels start turning. They run to a nearby picnic table to take cover beneath it. Frantic, they start debating what it could possibly be. When it passes, they rush to see Tanisha at the **art gallery**.

"What happened?" exclaims Timmy as he enters the door.

The **art gallery** was destroyed; every painting had fallen and every sculpture had broken. Tanisha was safe, but very upset. Some of her artwork was going to be shown tonight at a reception and now it was all ruined.

"My show is in one hour!" cries Tanisha. "How am I ever going to show my artwork if it is completely destroyed!"

Overhearing the stressful cries, Itty Bitty Kitty suddenly pops into the Gallery,

"Is everyone alright? Let's all calm down and relax a minute with a song."

They take a deep breath, but are interrupted by Digger tearing up the pile of junk and picking up items he finds enjoyable. This gives Hector an idea.

"What if we remade your art?" Hector explains. "We could make new art out of all this stuff!"

"This junk, you mean?" asks a confused Tanisha.

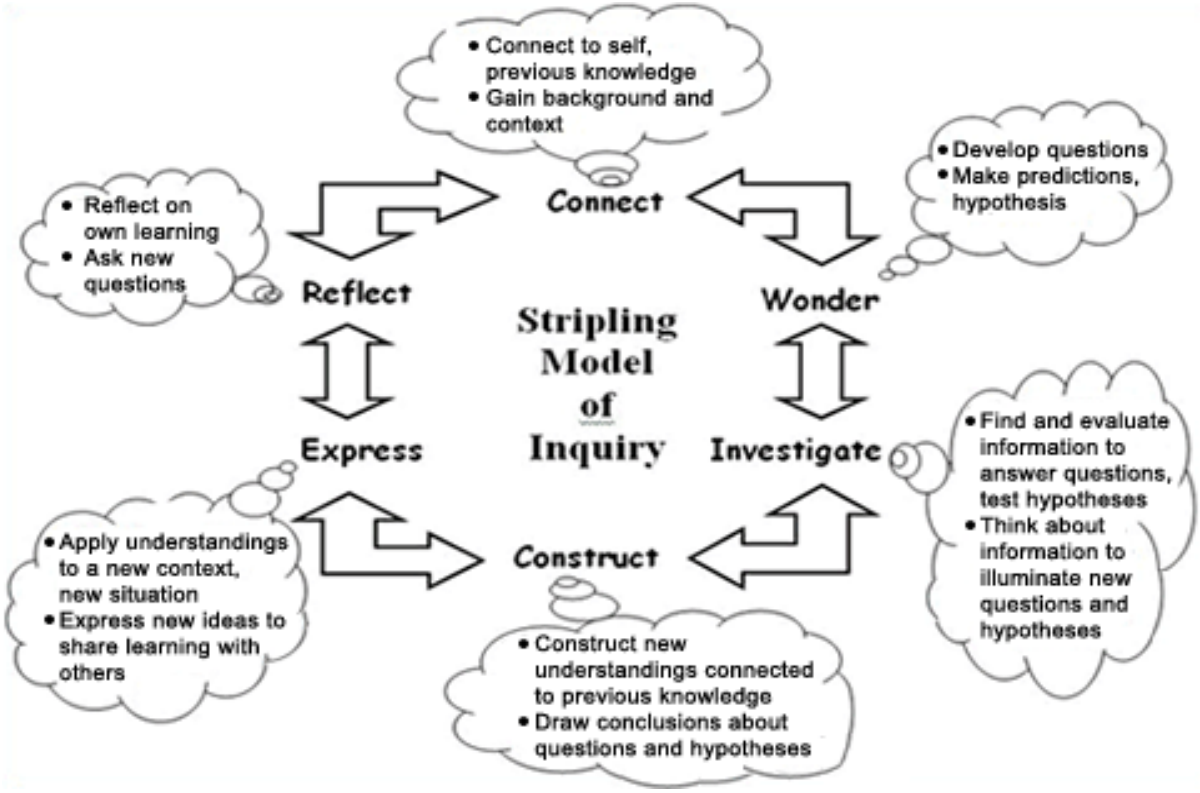
"It's not junk, it's art." says Hector.

"He's right." says Itty Bitty Kitty, "Music isn't music until you put all the pieces together! We can make art out of what's already here!"

The Curious Kids need your help! Can you help them make artwork for Tanisha's show out of junk and also find out what happened to make Curiosity Creek shake?

Another Influence on the Design Process and Program Approach

Stripling's Model of Inquiry, used by many school and public librarians nationwide, complements the Engineering Design Process as children are encouraged to make connections to their knowledge and experiences, wonder about questions, and investigate to test their hypotheses.



If you look carefully at Stripling's Model of Inquiry, you can see where there is some synergy between it and the Engineering Design Process. Her Model of Inquiry recognizes that "research is messy and recursive; inquiry is more so because no one knows the end" (Stripling, 2008, p 51); this is also the case with inventing which often can often be messy, requiring multiple attempts (i.e., going back to the proverbial drawing board) before finding a solution to a problem. The problem or question, in her inquiry model, is ideally one that is challenging and meaningful. It must be "worthy" of the child's exploration.

One of the designers on the project team created a crosswalk between the models that you can examine below. Additionally, in each of the session plans in Part 2 of the book, we add colorful pointers to show where different aspects of the Stripling Model of Inquiry are used.

Engineering Design Model & Stripling Model of Inquiry Crosswalk

Engineering Design Model	**Ask** • What's the Problem?	**Imagine** • What's your big idea? • How can the problem be solved?	**Choose & Plan** • Choose the best solution and the steps needed. *NOTE: This phase often requires research and investigation to identify the best solution*	**Create/Build** • Do it!	**Test** • Will your solution work?	**Improve & Share** • Make changes and share with others.
Stripling Model of Inquiry	**Connect** • Connect to self, previous knowledge • Gain background and context	**Wonder** • Develop questions • Make predictions, hypothesis	**Investigate** • Find and evaluate information to answer questions, test hypotheses • Think about information to illuminate new questions and hypotheses	**Construct** • Construct new understandings connected to previous knowledge • Draw conclusions about questions and hypotheses	**Express** • Apply understandings to a new context, new situation • Express new ideas to share with others	**Reflect** • Reflect on own learning • Ask new questions

Connecting the Program Elements

The combined literacy-based activities of the read alouds and the Curiosity Creek problem-based story scenarios provide the catalyst for the innovation activities that follow. The innovation activities often relate to STEM content and are designed to encourage creativity and inventive thinking. Sometimes, they will encourage working in teams while other sessions feature more independent activities. They will be based upon knowledge gained through the books read and the problem-based story scenarios; they set kids on an adventure in which they hope to find a "happy ending" for the characters in Curiosity Creek.

Finally, the family literacy component is encouraged through inviting parents to stay at the library and interact with children and acknowledge their accomplishments following each session. A take-home suggestion is also provided for parents in the session plans.

Guidelines for Implementing the Literacy-Innovation Connections Program

You may choose to use these resources however you wish. This project contains 24 individual sessions. Each session takes place in a different setting within Curiosity Creek and corresponds to a number on the map. Sessions may take place in any order, as they are independent of one another. However, you will find that many sessions involve similar skills and flow nicely into one another. Once you read Chapter 3's brief overview of each session, you may decide for yourself which ones you feel will work well together for your particular library's needs. The session activities will help participants learn the tools necessary to successfully complete the design thinking process and build literacy skills through STEM based activities. Every session is designed to meet the needs of all learners and can be easily modified for various age groups. You will find all necessary information to successfully perform the lesson within the session guide, including materials, modifications and adaptations, book suggestions, big ideas, procedures, and optional extension activities. Please use the following guidelines to help you select the sessions most fitting for your library. The guidelines on the next page assume you are going to offer the program either in the fall or spring for 12 sessions.

Guidelines for Initiating the Program

Go through all the program sessions and choose the 12 you feel are most appropriate for your young patrons. While each program session will refer to the paired literary and informational texts that can be used, it is your choice which you prefer to use.

In the first session, kids will need to have an initial introduction to the program and how it involves the elements of inventing, stories about kids who solve real problems and inventors, characters from Curiosity Creek who also have problems to solve, learning how to create using the engineering design process, and thinking about what makes stories great (Story Elements graphic), etc.

Hand out the maps of CC (Curiosity Creek) and point to the large poster to show them all the different settings within CC and that each week they hear about the characters, setting, and a problem that needs to be solved. Have the character poster handy so that you can tell them about some of the characters they'll hear about in the weeks to come.

Introduce kids to the concept of inventions. See if they can tell you in their own words. Tell them you'll be reading about cool ways that kids have solved problems. Then, introduce them to Hector, a kid from Curiosity Creek who loves to invent things. Show them the poster with Hector that includes the engineering design cycle.

After this general introduction, ask them if they are ready to begin the program or have any questions. Now, you are ready to introduce them to the first session you have selected.

USE THIS PAGE FOR YOUR NOTES

Guidelines for Improving the Literacy Component

The style of storytelling encouraged in the program is one that actively engages the child in the reading experience as the librarian reads aloud. Research has indicated that deeper participation by young children in the reading experience results in better literacy outcomes related to language skills, comprehension, expression, elaboration, and more. General guidelines for reading the books include:

Introduce the book by showing the cover and asking children to predict what the book is about just by looking at the cover. If the book is a literary book (storybook) as opposed to an informational text, ask children to predict what the "story" might be about.

Tell the story, pausing to give children the opportunity to interact or ask questions. Prompt children to fill in missing information. If possible, see if children can relate the story to their own personal experience. Having children relate to their life experiences and interests is an effective strategy for increasing comprehension, receptive vocabulary, and engagement. For younger children, check for understanding with additional prompts.

Feel free to use manipulatives in telling the story, if you have them. This may increase their engagement. For example, puppets, props, or toys may be used.

At the end of the story, and in a playful manner, prompt children in a way that helps them recollect story structure. "Where did the story take place?" "Who were the main characters in the story?" "What was the problem?" Then, have different children help to retell the story in their own words. "Now, let's retell the story." Give as many children as possible a chance to practice retelling. Use additional prompts, when necessary, such as "What happened next?" "And then?" "How did the story end?" Allow children to use manipulatives if they want to help in retelling. As the program continues, children may get comfortable enough to even want to role-play parts of the story.

This should lead into a related problem that is taking place this week in Curiosity Creek. Read the problem-based story scenario using the story visual that was prepared for it.

We hope these guidelines are helpful. In the chapters that follow, you'll find detailed session plans and problem-based story scenarios that take place in different parts of Curiosity Creek.

Marketing the Program

Why do you need to market this program?

Marketing the program is important for a number of reasons. The purpose of marketing the program is to inform potential participants about the program and what it will involve. For this reason, it is necessary to include pertinent information both about the program (the concepts behind it, what each session will look like, etc.) and the practical information for each session (when and where they will take place, what age groups they are intended for, etc.). A result of informing potential participants about the program is that a greater awareness of the program will be spread, which is likely to spark interest in a wider and more diverse audience within the library community.

What do you need to know about your target audience before planning your marketing?

Depending on which strategy is being used, the target group of the marketing will change. Materials sent to schools or children's programming should be directed towards the children, to interest them in the program so they will want to participate. Most of the other materials and strategies should be directed at parents, so that they will tell their children about the program.

Most of them will be general, not specific to each individual person who might see or hear the materials, unless the library chooses to directly market to individual patrons using their contact information which, as mentioned above, is up to the librarian's discretion whether to use it or not.

What basic information should be included when marketing this program?

It is important that the marketing materials hold the appropriate information, specifically the title of the program, what the program involves, what the time commitments are, what age ranges the program is geared toward, and when (including dates and times) sessions will be held. As much information should be included in these marketing materials as possible; the information that is unique to each library (such as when sessions will be held) should be decided upon prior to marketing. Finally, and most importantly, contact information for the important figures of the program, specifically the library director and librarian who will host the program, should be included so that any questions potential participants have can be directed to the appropriate people.

What are some ideas for marketing this program and its individual sessions?

In terms of marketing, in addition to the provided flyers, posters, and postcards (you can access digital copies of these from The Innovation Destination, the libraries have several options. The easiest option for marketing outside of the library with the greatest scope is through a press release, which involves sending a written blurb about the program to a selected set of press or broadcasting companies, such as physical or electronic newspapers, local news and newsletters, television, radio, or social media. These releases can be sent via email or posted as the situation demands and should include the information detailed below. Specific announcements to notify the community and gather interest are also marketing options and can be sent to local schools, PTA meetings, parent groups, library programming for children within the targeted age range for the program, and community organizations. Finally, the libraries can also market directly to patrons by using non-media advertising through mail, e-mail, or over telephone. However, this would require use of patron information in order to contact them, so this method should only be used at the librarian's discretion if it is deemed appropriate.

Because the number of participants for your sessions may differ from week to week, it's important to market individual sessions, as well as the overall program, in order to encourage continued participation. Many libraries use their library's Facebook page and/or website to do this as well as signage in the library to attract new participants. For example, for Session #1, the marketing strategy could be as simple as "This week, in our Inspiring Invention Through Stories program, your child will learn how to build his or her own flashlight through fantasy and electronics." Here's another idea for Session #16: "Come join us this week for our Inspiring Invention Through Stories program. Kids will be challenged to take a "bucket of junk" and create their own original artwork." You could even use the graphic for Session #16 to attract attention with the suggested verbiage above. Or post the graphic on your library's website. To encourage

kids to come back for the next session, give them the graphic for the next session as a take-home coloring page. Ask them to bring it back for next session to post on the library bulletin board or taped to windows or walls.

Additionally, when making or implementing the marketing materials, here are some ideas to consider. First, especially in social media posts, include pictures, either from the program book of the characters or, for later marketing materials, pictures from previous sessions, with parent permission. Second, consider using both active and passive marketing. It might be worthwhile to use flyers and pamphlets that are out for patrons to use or see as well as send out a press release to reach different groups. They could also be combined into one marketing endeavor, such as putting up a display within the library in the weeks before starting the program by printing out some of the digital included materials (for example, character cut-outs and the map of Curiosity Creek) and then specifically talking to any patrons who appear interested in the display. Third, make sure that the marketing is straightforward and simple, while engaging the target audiences; they should have all the facts the potential participants need to know, but they should also show that the program will be fun and engaging, especially the marketing materials designed for the children. Finally, every member for library staff should know the information about the program sessions (when they will be held, for what ages the sessions are designed, how many sessions are planned, etc.) so that, no matter who is staffing the circulation desk or interacting with the patrons, details about the program will be shared.

Works Cited in Chapter 1

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Chapter 2: The Context and Characters of Curiosity Creek

In this chapter you will gain a greater understanding of Curiosity Creek and the characters that make up this small rural community. Each session is numbered and corresponds to a location on the map which is the "setting" for the problem-based story scenario that takes place within Curiosity Creek. Each session features a read aloud of a storybook or informational text that can be used as a mechanism to inspire innovative thinking and problem solving before the actual problem-based scenario is introduced. In other words, the librarian will be telling different stories each week, but the story of Curiosity Creek is a continuation throughout the series of program sessions (as if they are chapters of the same story with a different problem introduced each week). In Part 3 of this Program Handbook, you will find the list of recommended books that are related to each program session. You may already have many of these in your children's collection. Additionally, you'll find a list of other possible books you could consider if you don't have some of those listed in the session plans.

Other high resolution digital session aids available to you include a large poster of the map as well as small character posters (which you can turn into character cut-outs), a poster of Hector and the Engineering Design Process, as well as a complete set of collectible character bookmarks (13 in all). Children will love having their smaller map/passports to keep at the library and stickers can be placed on all the places they have visited. All libraries have access to the electronic files for these printables at the Innovation Destination website (https://theinnovationdestination.net/home) by visiting the Making Literacy-Innovation Connections page.

Settings & Session Map
Map of Curiosity Creek

[Note: The image above is the large poster map of Curiosity Creek with session numbers.]

As noted on the previous page, you will have access to print-resolution large poster file of the map above as well as all the handouts of small size maps for your young patrons. As you perform each session, show the session location to the children on the map. As they complete each session, you or your participants can place a small sticker over (or beside) the number of that session. It may be in your best interest to save participants maps/passports from session to session instead of sending them home. This will encourage them to continue the program, as well as alleviate the problem of participants losing or forgetting their maps/passports. The flip side of their map also includes innovative thinking challenges and activities for participants to complete as they wait for the program to start or in any other "free time" they may have.

The Curious Kids and Other Characters

The Curiosity Creek characters are very important to this program because they act as a link between literacy and innovation. Children will learn that characters are "story elements," and that they have character traits that make them unique. To reinforce this, you could print out the Curiosity Creek character bookmarks in order to help children learn about the characters involved in the problem-based scenarios. They can collect these week-to-week. These characters play important roles in the stories and participants will come to know them very well. The link provided takes you to a resource page called RUNNING the program. Just scroll down to access them.

Mimi

Mimi, manages the Curiosity Creek Clubhouse and hosts the Homepage Videos. She is a nature-lover, an environmental educator, and the information expert on the Curiosity Creek area. She uses her video camera and smartphone to collect information and capture the beauty of nature. The Curious Kids and local characters love her warm personality and enthusiasm while visitors enjoy walking tours and discovering little known facts about Curiosity Creek.

Teenie Genie

Teenie Genie is a lovable character who enjoys reading, listening to stories and making up his own. He is always around to help Mimi with just about everything. He is not sure how old he is but thinks he's over 200 which is young for a genie.

Mac

Mac, the information detective, works out of an office inside an old tall tree in Curiosity Creek. He is a slightly bungling character, but well-intentioned, who tries to help the Curious Kids with clues and tips for information seeking. He envisions himself as a sort of superhero in a world of information where having the right information skills will unlock mysteries.

Ms. Cortez

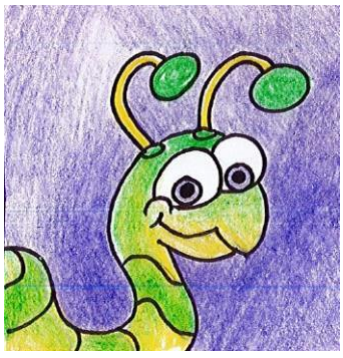
Ms. Cortez, the beloved Children's Librarian at the Curiosity Creek Public Library, is warm and supportive and helps the Curious Kids whenever they visit her library. Sometimes, they come in for a school assignment but not always. One time, for example, Tanisha visited Ms. Cortez for help finding information about local fossils to solve her out of school information quest. Ms. Cortez also runs The Innovation Space in her library. Actually, the library is pretty small so the Innovation Space is actually a big cart filled with lots of interesting stuff that she pulls into the middle of the children's room to transform into the Innovation Space once a week.

Muff and Scruff

Muff and Scruff live in the Marshlands, speak in gobbledigook, love games, and are born pranksters. Interestingly, everyone in Curiosity Creek can understand them and speak their language. In fact, by listening carefully, many kids may eventually crack the code allowing them to understand the language and with practice, even speak it!

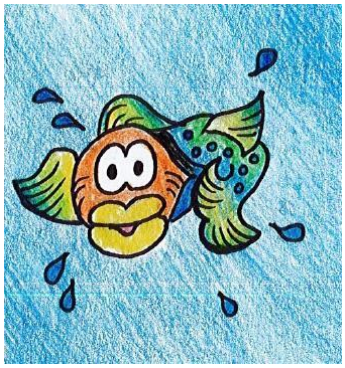
Itty Bitty Kitty

Itty Bitty Kitty is soft spoken and enjoys curling up in cozy place with the sun beaming down on her. She also loves music so you'll find her tinkering on her piano or playing the uke. She thinks music is a great way to share what is learned in an information adventure. Sometimes, Itty Bitty Kitty will even use music to calm down a stressful situation.



Squiggly

Squiggly is the star in the storybook "The Curious Kids and the Squiggly Question." In the book, he becomes a butterfly but on the Web site he is forever a caterpillar! He is a wonderful, fun-loving creature who really brings nature to life for the Curious Kids!



Figgy The Flying Fish

Figgy the Flying Fish is among the many creatures that live in the Creek. She loves to jump and play in the water, especially when the Curious Kids joins her in the fun. Curiosity Creek runs throughout the entire village, so Figgy can follow the Curious Kids wherever they decide to explore!

The Curious Kids

The Curious Kids (Tanisha, Timmy, Chen and Hector) are always asking "Why . . .?" and "How . . .?" Their natural curiosity leads them to explore for answers to their many questions. They consider themselves to be junior information detectives. That's not to say, however, that they do not meet challenges or become susceptible to information overload or confusion along the way. That's often part of the process of inquiry. However, with a little guidance, and using their skills, they get back on track! They act as a team, working collaboratively on most adventures. They are good friends and generally play fair but like other kids, nobody is always perfect.

Hector

Hector sees himself as a cool "inventor in the making." He is always trying to find solutions to things he thinks are problems (the Curious Kids are not always sure they really ARE problems and while they like Hector, he is sometimes a bit annoying with his over-the-top enthusiasm and "coolness.") Sometimes, his inventions work and sometimes they don't but he never gives up. He needs to wear glasses but naturally they reflect his own style. Hector calls his bedroom the Invention Dimension.

Tanisha

Tanisha is an artist. She is also the skeptic of the bunch. She is somewhat analytical for her young age, and doesn't always buy into Mac's zany ideas. Sometimes, she can be a little bit bossy, but luckily she has a good sense of humor, too. She is excellent at taking notes and uses this skill often. She loves to read, just like the other kids, and uses her creativity to help the Curious Kids find solutions to problems.

Timmy

Timmy is a little shy but he blossoms when he takes on being an info sleuth in a new adventure. He uses his drawing ability to record his observations. One time, he used his drawings to create an original book to share what he learned with friends and family at a backyard fair. Whenever he gets really nervous, his friends are there to encourage him. He has a cousin, Sandy, who lives about 20 miles away; she loves to visit Curiosity Creek and join in the adventures of the Curious Kids.

Chen

Chen is an active kid who loves feeling like an "explorer" and taking pictures to record his discoveries. One time, while digging in Mac's garden, he discovered (with Digger's help) what they thought was a real "fossil!" That was the beginning of another adventure. Chen's mom often helps by driving the kids around on their missions. He is enthusiastic and always willing to take on a challenge. With the help of his sidekick Digger, Chen always finds new and exciting places to explore!

Digger

Digger is Chen's rather ambitious dog, that is, when it comes to bones. He always looks for them and tags along on every adventure hoping he will find a juicy bone along the way.

Now that you've met all the characters who provide the weaving thread from one program session to the next, Chapter 3 will give you an overview of each session and the problem-based scenario that participants will tackle. Later, In Part 2, you can access the complete session plans which are available both in this Program Handbook as well as in the searchable database of The Innovation Destination.

Chapter 3: Session Breakdown with Location/Setting Information

In this chapter, you will receive a quick look at each program session, including a brief overview and essential question(s). You will also learn more about each session's setting/location in Curiosity Creek and gain a greater understanding of the community in which each session will take place in the context of the problem-based scenario. After reading the session's suggested book to inspire inventive thinking, the children's librarian will introduce the session's problem-based scenario that always takes place in Curiosity Creek. To help students better understand the problem-based scenario, there is an accompanying picture to set up the scene. You will read the problem-based scenario as you show participants the illustration. Please see the example below for the session "Hector's Mechanical Animals." Most of the illustrations are in black and white.

Session Breakdown Brief Descriptions

The sessions are broken down by their relative locations. So, for example, the first three sessions all take place at the Curious Kids' Clubhouse. This does not infer a suggested sequence; you can mix and match sessions however you wish!

Location:
The Curious Kids Clubhouse

The Curious Kids' Clubhouse is a meeting place for all the Curious Kids and their friends to gather and invent! The clubhouse is a space for collectively thinking and brainstorming as a group to find solutions to multiple problems. The Curious Kids spend a lot of their time in the clubhouse inventing new and exciting things! The following three sessions take place in and around the clubhouse. In the *Curious Kids Code,* participants will learn about programming and have to come up with step-by-step procedures in order to code a robot. Similarly, in *Curious Kids and Circuits,* participants will have to problem-solve to create a working circuit. Lastly, in *Bubble Boredom Begone*, participants will design and test a variety of geometric bubble wands. These sessions are great for participants who love math, science, and coding.

Session #1: Curious Kids Code

How do we communicate with computers and robots to get them to accomplish tasks?

In this activity, participants will learn about coding. Children will come to understand that computers may seem smart, but that they need someone (the programmer) to tell them what to do. After reading texts that explain the concept of coding in broad, simple terms, they will read a story about kids coding a sandcastle. In the warm-up activity, participants will "program" the librarian to make a peanut butter and jelly sandwich. Then, in small teams, students will use physical activity to program other session participants to step carefully from place to place until a goal is achieved. Throughout the activities, students will move through the engineering design process as they plan, create and then improve on their instructions as part of the debugging process.

Session #2: Curious Kids and Circuits

How can you use your knowledge of circuits to create a functional flashlight out of a few simple materials?

In this activity, participants will design and build their own LED Popsicle Flashlights out of common craft and office supplies. In the literary text, participants will read about a bird who learns about circuits. In the informational text (optional), participants can explore circuits. Then, thinking about the problem-based scenario with the Curious Kids, participants will work independently to design and build their flashlights.

Session #3: Bubble Boredom Begone

How can you use your knowledge of shapes to create a 3D bubble wand?

In this activity, participants will learn about bubbles and geometry. Then, thinking about the problem-based scenario with the Curious Kids, they will individually design and create 2-3 types of geometric bubble wands. Finally, they can test the different shapes and designs to see which ones blow the best bubbles.

Location:
The Marshlands

The Marshlands are the home of Muff and Scruff. It is a great place to explore and partake in new adventures! It is also home to many creatures waiting to be discovered by the Curious Kids. The following two sessions are full of excitement and participants will have to use their imagination to put themselves in the Curious Kids' shoes. In *Tiny Creature Creators* participants will have to really think about what makes different animals unique. Similarly, in *Bionic Beaks*, participants will have to figure out a way to help an animal in need by using their inventive skills. These sessions are great for participants who love animals, designing, inventing, and using their imaginations.

Session #4: Tiny Creature Creators

What makes an animal well-suited to a particular job in its environment?

In this activity, participants and their parents will consider what characteristics would be best for a creature who serves as a "guide" in a world where people have shrunk in size. After reading texts about adaptations of actual tiny animals and a literary text about a hybrid fictional animal, each participant will critically apply these ideas to create/craft their very own fictional animal that is best suited for a particular job. A reflection discussion at the end of the activity will give all participants the chance to share their creations and reflect on the process.

Session #5: Bionic Beaks

How does an injured body part affect an animal in the wild?
What can humans do to help injured animals survive in their habitat or in captivity?

Bionic Beaks introduces patrons to America's national bird, the bald eagle, *Haliaeetus leucocephalus.* Beauty the bald eagle has been injured and needs help from wildlife biologists and engineers to repair/replace part of her beak. During this session, participants will learn how scientists and engineers use technology to design and 3-D print body parts. The librarian will read two books (optional): a literary book about invention and an informational text about a bald eagle whose beak has been injured and needs replacement. Participants will then have their own chance to create a prosthetic device. Participants will be able to design and build their own replacement body part for their favorite animal, pet, or stuffed animal. Participants will have access to a variety of materials to create a prosthetic device. Participants may have to create more than one design to create the best prosthetic.

Location:
The Fishing Dock

The Fishing Dock is a place where the Curious Kids can kick back and relax. They love visiting their friend Figgy the Flying Fish, and learning about new and exciting things beneath the surface of Curiosity Creek. Many times, the kids watch Digger splash in the water and discover hidden treasures beneath the surface. There is a lot of wildlife around the fishing dock that the kids love to watch quietly and observe. The following three sessions take place at the fishing dock. In *Hector's Mechanical Animals*, participants will have to help save Hector by inventing a mechanical animal that will help rescue Hector from a Bald Eagle's Nest! In *Fly Me To The Moon*, students will experiment with balloon rockets after contemplating how various animals 'hop' around. Lastly, in *1 Thing, 2 Things, Nature Things, Tree Rings*, participants will think about how tree rings are created and what they can tell about the life of a tree. These sessions are great for participants who love nature, math, science, and designing.

Session #6: Hector's Mechanical Animals

What animal would be best suited for reaching high places, defending oneself, and tactical retrieval of something important?

In this activity, participants and parents will be faced with a problem requiring them to think about how to execute a specific task. Participants are given a challenge to help a fellow Curiosity Creek character who is stuck in a sticky situation. Not only must they reach the specific character, but also retrieve him, defend themselves, and return home safely. Participants will not only have to consider the location of the character, but also specific animal characteristics and attributes that may help them complete the mission successfully. After choosing an animal, participants will design a mechanical version of that animal that will help them rescue the Curiosity Creek member. Participants will have to think about design and specific functions within the design to help them perform various tasks while on the mission. Participants will share their designs and compare inventions to better reflect upon the creative process.

Session #7: Fly Me to The Moon

How can you build a rocket to follow a trajectory and hit a target?

This activity will focus on children identifying parabolas in their environment and then designing and building a balloon rocket that lands on a specific target. This will require children to assess and redesign their rocket to hit a target with accuracy. Participants will listen to one or two (optional) literary/biographical texts; One about a mathematician, and another about the first computer programmer. In this activity, participants will design, construct, and test a balloon rocket that will fly along a trajectory to hit a specific target. After listening to the read aloud(s), participants will brainstorm ways to create a rocket that will meet the specifications to hit a target. Participants will choose from the materials provided to create a rocket that will help the Curious Kids solve a problem. Participants will test their rockets and provide verbal feedback to one another on their rockets.

Session #8: 1 Thing, 2 Things, Nature Things, Tree Rings

What can a tree tell me about its life?

In this activity, children will learn how to become careful observers of wildlife and nature. Participants will experience a nature walk and learn how to observe without destroying any of nature's wonders. Participants will then learn more about the kinds of elements trees have to endure to continue to thrive and grow. Participants will then draw/paint the stump of a tree and create a story explaining the reason behind its rings. Using background knowledge, as well as newly learned vocabulary words, the participants will learn not only how to say dendrochronology but also be able to do it.

Location:
Mac's Treehouse

Mac, an information detective, lives in an amazing treehouse in Curiosity Creek. The kids love visiting Mac and experimenting with all his detective gadgets. He is always available to offer them advice and assist them on their missions to find answers or solve a problem. Surrounding Mac's house are large rocks, trees, sticks, paths and of course the Creek. This allows the kids to experiment with many natural materials. The following three sessions take place at Mac's Treehouse. In the session, *Walk Like an Egyptian,* participants will become miniature architects and send themselves back in time to think like a pyramid builder. In *Cloudy with a Chance of Fun*, participants will pretend they are at the very top of Mac's tree and look at the various kinds of clouds in the sky and try to come up with their own type of cloud. Lastly, in *Cranes that Lift, Not Fly*, participants will think about how cranes work and possibly how Mac built his treehouse using one! These sessions are great for participants who love engineering, designing, and using their imagination.

Session #9: Walk Like an Egyptian

How were ancient Egyptians able to accomplish so much without modern day technology?

In this activity, children will learn how ancient Egyptians were able to accomplish written communication, architecture, and life skills. Children will learn to use hieroglyphs. Children will design and build a pyramid. Children will also learn how the mummification process works, and will have the opportunity to try it at home. Using background knowledge and newly learned vocabulary words, the children will learn how tasks can be done without modern day technology but instead with the scientific process.

Session #10: Cloudy with a Chance of Fun!

If you could design the clouds, what type of clouds would you create and why?

In this activity, participants will learn about weather and cloud formations. Children will identify different types of clouds and their descriptive properties. After reading texts explaining the different cloud types, children will help decipher what type of precipitation can form from each cloud. Through creation and play, participants will be able to build clouds through sensory activities and soap cloud experimentation. After playing and experimenting, children will be asked to brainstorm and create new types of clouds that no one has ever seen before. What makes it so different? Using the background knowledge and definitions of the vocabulary words, the children will have a better understanding of the different types of clouds to help create and design their own cloud sky.

Session #11: Cranes that Lift, Not Fly

Can you build a super-strong crane that doesn't tip over?

In this activity, participants will learn about cranes and how they are used for lifting and moving heavy objects. Children will learn that it is important to have strong and stable cranes. Preventing them from tipping over while carrying heavy loads is a challenge. Children will also learn detailed information about cranes, such as the fact that they actually hoist to lift objects but cannot move them sideways. Children will then create/build and improve in repetition to get a strong, stable crane. Using background knowledge and newly learned vocabulary words, the children will learn about trusses and counterweights.

Location:
Curiosity Creek Library

The Curiosity Creek Library is a favorite place to visit by all Curiosity Creek characters. At the Library, they can find all the answers to their questions, or at least enough information to point them in the right direction! Ms. Cortez, the librarian, is always looking to help, and offers wonderful suggestions to help steer her patrons in the right direction. She especially loves when the Curious Kids come to visit. The library has become a place of collaboration and 'superpowered' brainstorming sessions for the Curious Kids, and it is rarely quiet! One of Ms. Cortez's favorite things about the library is that it is surrounded by hundreds of birds. She loves listening to their music and has put up lots of birdhouses around the library. In both *Bird Feeder Builders* and *Ear Engineers*, participants will think about birds and the environment, considering how bird feeders work, as well as how we could possibly hear the sounds of nature more efficiently. In the session, *The Curious Kids Create Catapults*, participants will have to help reopen the Curiosity Creek Library by designing a catapult, due to some unforeseen pranksters pulling a joke! These sessions are great for participants who love the outdoors, designing, and engineering.

Session #12: Bird Feeder Builders

How can limited resources be used to build a birdfeeder to meet certain requirements?

In this activity, participants will design and build a bird feeder that can be hung off the ground using a variety of materials. After reading a literary text about a man who battles squirrels at his birdfeeders, the group will explore an informational text (optional) featuring various ways to make bird feeders out of ordinary recycled items at home. Using these texts as inspiration, participants will work individually to create and build their own bird feeders to help the Curious Kids arrive at a solution to their problem. The session will wrap up with a show-and-tell discussion, in which participants will describe and reflect on their process.

Session #13: Ear Engineers

How can you design a device to improve your hearing?

In this activity, participants will design, construct, and test a contraption that will increase their ability to hear noises from their environment. After listening to a read-aloud of an informational text focused on how different animals' adaptations help them hear better, and discussing ways humans can improve their directional hearing, participants will choose from a variety of materials to build a wearable contraption that will help the Curious Kids solve their problem. The session will conclude with participants testing their creations, sharing them with the group, and reflecting on the process.

Session #14: The Curious Kids Create Catapults

What materials and design should we use to create a functional catapult?

In this activity, participants will design and build their own catapults and test them by launching marshmallows. In the literary text, participants will read about a mouse who thinks like a scientist and creates a catapult to help answer a question. In the informational text (optional), students can explore different types of catapults. Then, considering the problem-based scenario with the Curious Kids, participants will work independently or in pairs to design and build their catapults.

Location:
The Art Gallery

The Curiosity Creek Art Gallery is a wonderful place for the Curious Kids to visit and take in the beautiful art that is displayed there. Many times, the Gallery features local artists, and has even shown a lot of Tanisha's artwork! The Gallery loves unique and one-of-a-kind pieces and is always willing to display new creations. Two program sessions have the Art Gallery as their setting. In *Duct Tape Technicians*, participants will experiment with duct tape and other limited materials in order to create something new. In *Bucket of Junk*, participants will learn about recycled art and use their imagination to help them make something out of what may seem like nothing. These sessions are great for participants who love art, creating and designing.

Session #15: Duct Tape Technicians

How can you use your knowledge and imagination to make a working container out of limited resources?

In this activity, participants will devise an innovative way to transport rock specimens using only duct tape and craft sticks. After reading a literary text about a girl that loves collecting rocks, the group will explore an informational text (optional) that shows a few items that can be made with duct tape to generate ideas and inspiration. Then, participants will work in pairs to design, create, and test their own solutions to the problem. A reflection discussion at the end of the process will give participants the chance to share their creations and reflect on the process.

Session #16: Bucket of Junk

How can we use recycled materials to create/invent something new?

Students will create an art piece out of various recycled materials. Students will be given a "bucket of junk" and use the materials within to make something of their choosing. The creation does not necessarily have to have a purpose, but should be a creation of their imagination.

Location:
Itty Bitty Kitty's Place

Itty Bitty Kitty's house is a beautiful little cottage near an apple orchard in Curiosity Creek. The kids love visiting her because she plays the most beautiful music and has the loveliest voice they have ever heard. Itty Bitty Kitty always says how every song tells a story, just like a book! The Curious Kids love trying to figure out what different song lyrics mean and often tell stories with Itty Bitty Kitty around a campfire in her backyard. The following three sessions take place at Itty Bitty Kitty's place. In *Who Are You? Fingerprinting*, participants will learn about fingerprinting after they learn something has been stolen from Itty Bitty Kitty. In *Storytelling with Scratch*, participants will learn more about storytelling and practice telling stories using their coding skills. Lastly, in *Six Apples, Up on Top*, participants will pretend they are in the apple orchard by Itty Bitty Kitty's house and come up with a way to carry a stack of apples with limited supplies. These sessions are great for participants who love music, detective work, coding, and designing.

Session #17: Who Are You? Fingerprinting

How can we look at fingerprints and what can a fingerprint tell us?

In this activity, children will learn how to look at fingerprints in multiple ways. Children will experience the scientific process of step by step deduction. Children will be able to decipher how to read fingerprints. They will also learn where fingerprints can be found. Using background knowledge and newly learned vocabulary words, participants will be able to create a story based on a person's fingerprint.

Session #18: Storytelling with Scratch

What is the best and most efficient way to code/tell the story using Scratch?

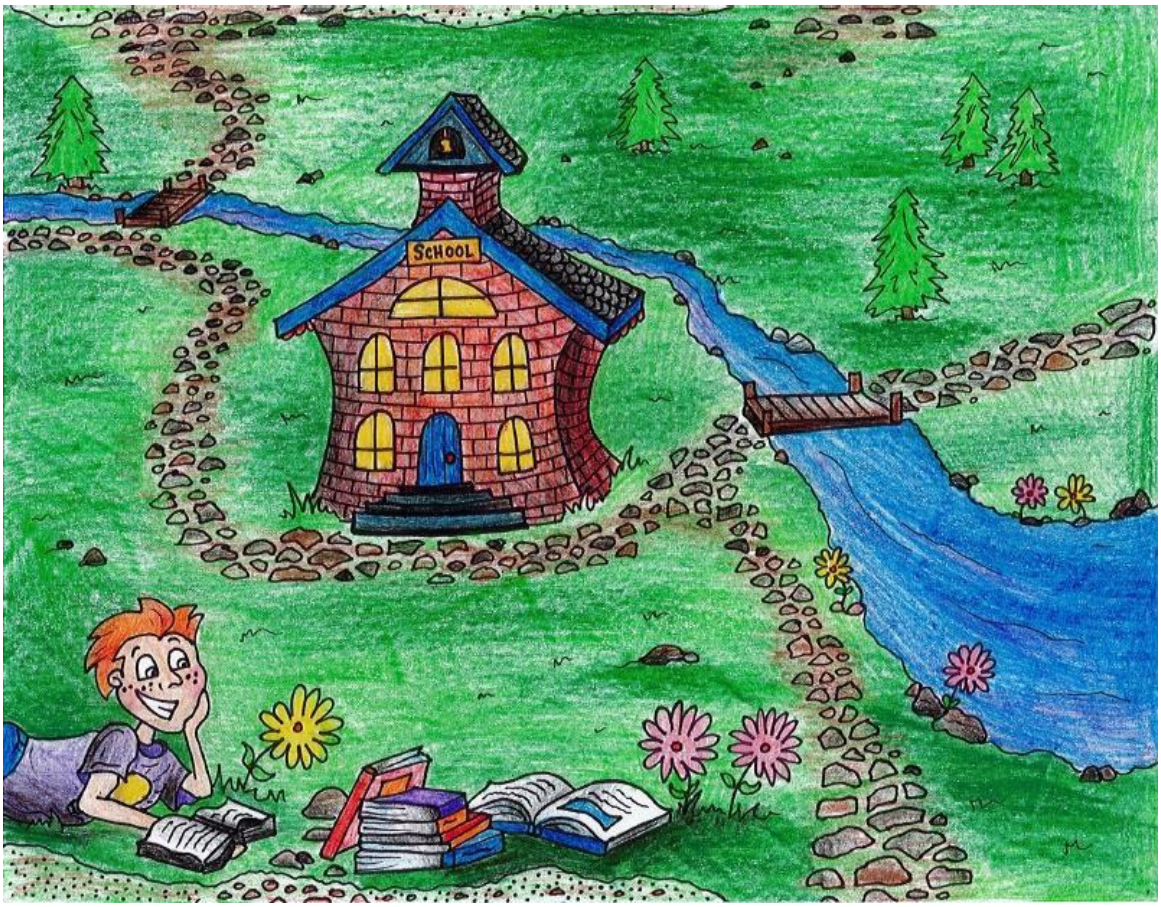
In this activity, participants will practice storytelling and the engineering design process by creating a story using Scratch, a free web-based visual programing language. This activity helps children learn some fundamentals of computer programming, while they practice their storytelling skills in a creative and open-ended format. At the end of the program, participants will have the chance to share their stories with the class and reflect on the process. Note: This session would be great after "Curious Kids Code".

Session #19: Six Apples Up on Top

Based on the materials provided, can you design and build a structure to support six apples stacked on top of one another?

In this activity, participants will design and build a structure to support six apples stacked up on top of each other. If available, begin by reading *Ten Apples Up On Top* by Theo LeSieg, a story about three friends trying to successfully stack 10 apples on top of their heads without them falling over. Following this, read *The World is Not a Rectangle: A Portrait of Zaha Hadid* by Jeanette Winter, which explores architecture through the eyes of a visionary. Participants will now have an idea of what an architect does and can now explore how to use those ideas and practice innovation and engineering design to create their own structure to support six apples, based on the Curious Kids' design challenge. After participants complete the challenge, participants can share their thoughts, ideas, and processes or use FlipGrid to record a short video about their design thinking and process.

Location:
Curiosity Creek Elementary School



Curiosity Creek Elementary is where all the Curious Kids attend school. They love their school and the fact that it is right next door to the main part of the creek where they can swim and explore. They have many friends at school and love meeting new ones to go on adventures with! A lot of their questions sprout from activities and lessons they learn at school, or from new friends they make. The following three sessions were inspired by instances just like that. In *The Curious Cuisine Cart*, participants will brainstorm marketing strategies in order to convince people to try new and possibly 'strange' food concoctions. In *The Science Fair Disaster*, participants will use their imagination and come up with a way to stop a giant robot from destroying the school and all of Curiosity Creek! Lastly, in *The Curious Kids Invent*, participants will learn about empathy and think about how they could use their inventive skills to help others. These sessions are great for participants who love trying new things, making new friends, inventing, and using their imagination.

Session #20: The Curious Cuisine Cart

How can you effectively communicate with a large number of people using light and/or sound?

Participants will come up with a way to stop a giant robot from destroying Curiosity Creek. Based on the story *Spaghetti on a Hot Dog Bun: Having the Courage to Be Who You Are* by Maria Dismondy, participants will develop a marketing plan/design an invention that will allow them to communicate with a large number of people quickly, while also utilizing light and/or sound. They will learn about how light andsound travels and why it is useful in communication devices. In the process, participants will develop a sense of empathy while reading about the differences between all people.

Session #21: The Science Fair Disaster

How would you stop a giant robot from destroying the world?

Students will come up with a way to stop a giant robot from destroying Curiosity Creek. Based on the book *Oh No! (Or How My Science Project Destroyed the World)* by Mac Barnett, students will design an invention to stop the destruction of their home. Students will invent something to stop the robot, either by shrinking it back to its original size or defeating it using specific characteristics pre-programmed into the invention.

Session #22: The Curious Kids Invent

Can you invent something to make yourself feel better when your feeling lousy? How can you invent something to make your life better?

In this session, participants will think about themselves, their own unique traits/qualities, explore how Temple Grandin thinks in pictures, describe an invention that Temple Grandin created, and then think about an invention that would help them in their daily lives. The session includes a mini-lesson on autism. After listening to two read-alouds, participants will design an invention designed to make them feel better about something in their life. It will also help the Curious Kids and their new friend explore what it's like to think in pictures and what makes them "Different, not less." Participants can respond with a written response or a pictorial response.

Location:
Curiosity Creek

Curiosity Creek runs through the entire town. However, there is one section of the creek with a small beach which creates a nice swimming spot for the kids. Here, the Curious Kids partake in many adventures and explore for hours. The creek is where they spend most of their time. They hunt for treasures beneath the surface and even bring snorkels so they can spend hours searching the creek bottom! Once they even built a raft so they could float along the creek quietly observing nature and search for animals. The following two sessions take place at the creek. In *The Penny Boat Challenge*, participants will be designing and building boats to see how much cargo they can keep afloat. In *The Curious Kids Build Candy Bridges*, participants will have to think carefully about how bridges work and why, as well as attempt to construct their own out of candy! These sessions are great for participants who love architecture, designing, building, and testing.

Session #23: Penny Boat Challenge

Can the shape or constructive materials of a boat affect its buoyancy?

In this activity, participants will devise an innovative way to improve a mini watercraft that will hold the most cargo. After reading books about crossing water and reviewing different types of animals and watercrafts that float, the group will create mini versions of watercrafts that will be tested with various materials. Participants will work in pairs or groups to design, create, and test their own solutions. A reflection based show and tell at the end of the process will give participants the chance to share their mini watercrafts and their results/solutions.

Session #24: The Curious Kids Build Candy Bridges

Which shape will allow us to build the strongest bridge?

In this activity, participants will practice the engineering design process by creating and testing bridges made out of gumdrops and toothpicks. After reading a literary text about Iggy Peck, a young boy who constructs a bridge to save his class on a field trip, the group will think about different shapes and their relative strengths. Next, use the informational text (optional) *Building Bridges* to learn a bit more about how bridges are constructed and to think about the shapes that make them strong. In a warm up activity, have children construct different shaped columns out of paper and test their strengths. Using what they learned, they will use their creativity to build the strongest bridge they can out of 10 gumdrops and 20 toothpicks. A reflection discussion at the end of the process will give participants the chance to share their creations and reflect on the process.

Summary

This concludes all Curiosity Creek settings, as well as the 24 briefly outlined sessions. Remember to emphasize that “settings” are important story elements. Please feel free to pick and choose what works best for your program. All sessions can be adapted or modified to meet the needs of your library. Please note that all session locations can be found on the Curiosity Creek map shown in chapter 2. As you perform each session, show the session location to the children on the large poster- sized map. As they complete each session, you or your participants can place a sticker over the number of that session on their small maps. Many libraries, as mentioned earlier, will likely choose to save participants’ maps/passports from session to session instead of sending them home and risk having participants losing or forgetting to bring in their maps/passports.

Part 2: Program Sessions

Content Organized by Settings

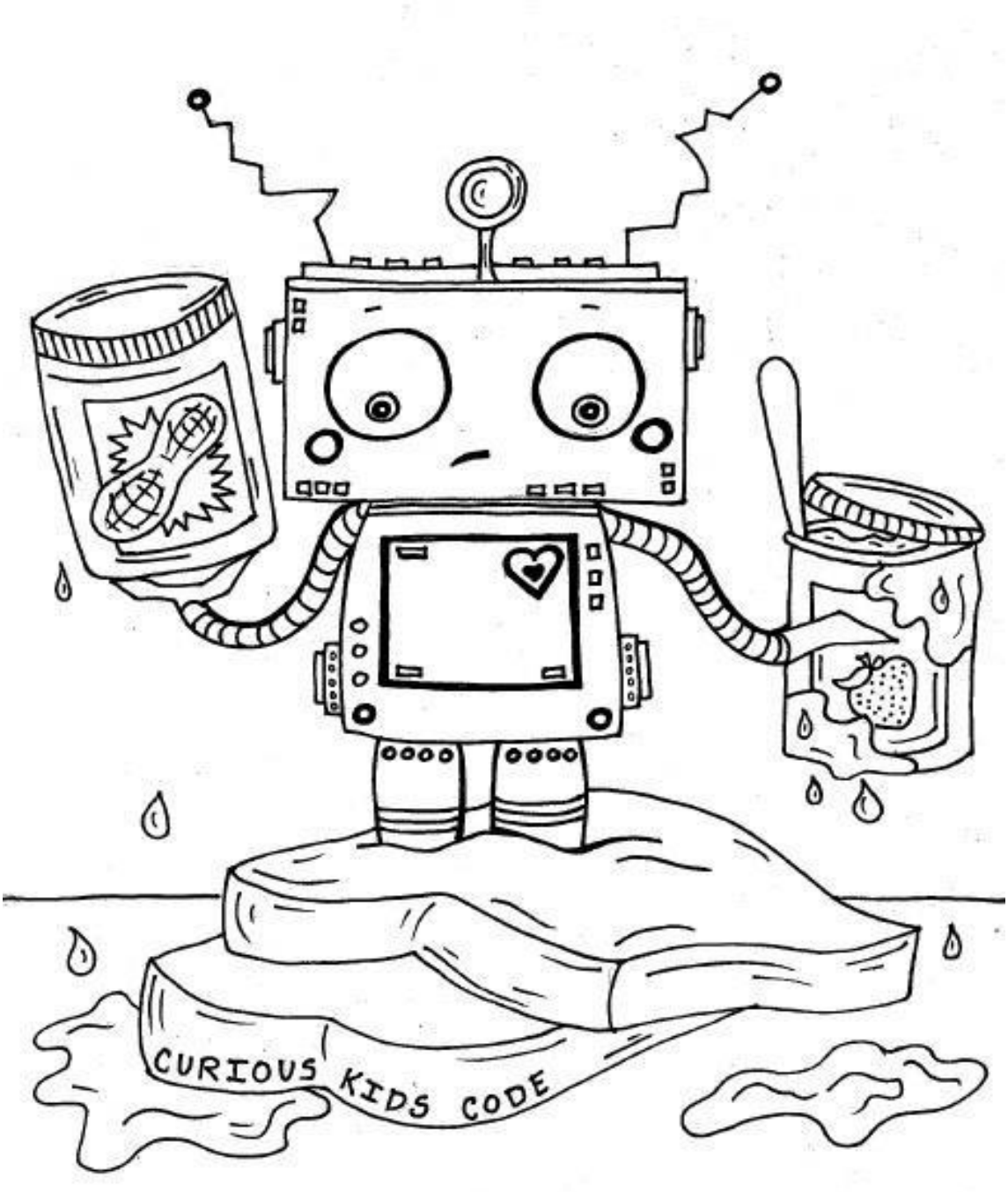
In this section, you will find 24 detailed and complete session plans for implementing this program. You may choose to implement some or all plans and schedule them on days and times that best meet the needs of your target audience.

Each session plan includes a graphic that can be used in a variety of ways during the session, the title, topic, literacy and science standard(s), engineering and inquiry process phase(s), target learning audience, recommended number of participants, timeframe, and a suggested marketing strategy. The session plan then presents the problem-based scenario that sets the stage for the entire lesson. It is important to have this scenario as early as possible in order to focus participants on their task. Each scenario is set in the context of Curiosity Creek and your audience is asked to help the character solve that problem.

The plan then provides a brief overview of the session, the essential question or problem, Big Ideas, the suggested text(s) read-aloud, essential vocabulary, content or background information, support materials, procedures, potential modifications, assessment(s) and appropriate credits. There also may be a family literacy component and relevant digital attachments to follow-up the session.

Chapter 4: Program Sessions in the Curious Kids Clubhouse

Inspiring Invention Through Stories
Program Session #1:
The Curious Kids Code



Title: The Curious Kids Code

Topic: Coding

Literacy Standards:

- CCSS.ELA-LITERACY.RL.1.1: Ask and answer questions about key details in a text.
- CCSS.ELA-LITERACY.RL.1.2: Retell stories, including key details, and demonstrate understanding of their central message or lesson.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Stephanie Prato

Target age range: Kindergarten-second grade; ages 5-8 years old

Number of participants: Recommended 12 participants. You may choose to accept more depending on materials and available staff.

Duration: Approximately 30-40 minutes.

Problem-Based Scenario:

The Curious Kids want to learn more about computers and robots. They know that robots can help them complete certain tasks. Teenie Genie creates a robot, but someone needs to give the robot instructions! How will they make the robot move? All of this questioning has made them very hungry. The Curious Kids need your help to figure out how to program the robot to make a peanut butter and jelly sandwich. Can you show them how to code their robot?

Brief Overview:

In this activity, participants will learn about coding. Children will come to

understand that computers may seem smart, but that they need someone (the programmer) to tell them what to do. After reading texts that explain the concept of coding in broad, simple terms, they will read a story about kids coding a sandcastle. In the warm-up activity, participants will "program" the teacher to make a peanut butter and jelly sandwich. Then, in small teams, students will use physical activity to program their classmates to step carefully from place to place until a goal is achieved. Throughout the activities, students will move through the engineering design process as they plan, create and then improve on their instructions as part of the debugging process.

Essential Question/Problem: How do we communicate with computers and robots to get them to accomplish tasks?

Big Ideas:

- Participants will realize that computers need clear instructions and a common language to function properly.

Literary and/or Informational Text(s):

- Literary: *How to Code a Sandcastle*, by Josh Funk
- Non-Fiction & Informational: *What is Computer Coding?*, by Mary K. Pratt (optional)

Vocabulary:

- *Programming* - creating steps or instructions for the computer to follow; the action or process of writing computer programs
- *Algorithm* - a precise sequence of instructions for processes that can be executed by a computer
- *Bug* - part of a program that does not work correctly.
- *Debugging* - finding and fixing problems in an algorithm or program.

Content or Background Information:

- This activity is based on the idea that computers (and robots) may seem smart, but they can only do what a programmer tells them to do.
- Participants will define a list of steps to get the teacher to make the sandwich, and later, to get a friend to move from their starting position to the goal. This list of steps is an algorithm.
- Participants will learn how to identify and fix errors in the execution of the algorithm. This is often referred to as debugging and is an essential part of the engineering design process.
- Other resources for unplugged or offline coding activities include: CS Unplugged and this section of Code.org

Materials and Preparation:

- Copies of the texts listed above
- Peanut butter and Jelly
- Plastic knife
- Two slices of bread
- Paper towels
- Printed or digital Code.org "Move it Move it" Debugging Handout (1 for displaying to the class)
- Printed handouts of "Move it Move it" Activity from code.org (Print 1 for each group of 2-3 students)
- Blank sheets of paper
- Optional: Take home worksheet

Procedures:

1. Welcome the group and, using the illustration from page 45, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. To help the group come up with ideas to help solve the problem-based scenario, read to them at least one of the texts listed on page 47.

Warm-up: Peanut butter & Jelly Coding (10 minutes)

3. Tell your participants that the Curious Kids are hungry and want their robot to make a peanut butter and jelly sandwich, but they don't know how to ask. In this scenario, you will pretend to be the robot, and the class will help the Curious Kids! Mac, the information detective, thinks that your participants have to give you the exact steps to make the sandwich, just as if you were a computer.
4. Call on one participant, who can give you (the robot) the first step. Act out what they say, literally. For example, if a participant says, "put the peanut butter on the bread," pick up the jar and place it on top of the bread. They need to specifically tell you to remove the lid, pick up the knife, etc.
5. Continue until the participants are giving short, specific commands. Focus on the engineering design process and how programmers have to create something and then improve on it.
6. Select another participant to call on, and repeat until you have successfully made the sandwich. You can decide how specific you want to be, but they should get the idea that computers need clear instructions. They do not assume things like people do.
7. Ask wrap up questions including: did the sandwich making go as expected? What challenges did you encounter? What surprised you about how the librarian/robot acted out your instructions? What did you change to make the steps easier to follow? [CONNECT]

Code.org "Move it, Move it" Activity (20 minutes)

8. Tell participants they are doing a great job helping the Curious Kids figure out how to program their robot. In this next activity, one participant will get to be the programmer and another will play the robot! The third participant will setup the map(s).

9. Split the participants into groups of 3. There are three roles (1) Choose/set up map (2) Programmer (3) Robot walking the course.

From Code.org

10. Put an image of Move It, Move It Teacher Debugging Puzzle - PDF up on the screen where everyone can see it.
11. Get the attention of the group and let them know that you are stuck! You have this challenge, and you thought you had solved it, but it doesn't seem to be working. Your program has a bug, can they help you fix it? [INVESTIGATE]
12. Take a moment to walk them through the rules:
    - Start at the compass rose
    - Follow the instructions step-by-step
    - End at the treasure
13. Ask participants if anyone was able to figure out a way to solve the problem. When you get a correct answer, let the participants know that they are great at "debugging"!
14. Hand each group of 2-3 participants a packet of Move It, Move It maps, as well as the blank papers for the grid on the ground. Allow participants to either cut the halves of each map apart, or fold the sheets in half so that each map is clearly visible (without distraction.) [CONSTRUCT]
15. Directions for the class:
    - Decide who will take each job.
    - Have player 1 set a grid on the floor made up of pieces of paper (as shown on one of the Move It Maps) except with the gem paper facing the ground.
    - Player 3 will start by standing on the page with the compass rose.
    - Player 2 will then guide player 3 step-by-step through the paper maze using the provided arm signals.
    - When player 2 gives the signal to "STOP", player 3 will flip over the page that they are on. If that page is a gem, then the maze was a success!
16. Reflect upon the process as a group. [REFLECT and/or EXPRESS]

Modifications for All Learners:

- Adaptations: Instead of having participants call out, you can ask them to write down the exact steps that you will need to follow to make the sandwich (including all ingredients, materials and utensils). Then follow one participant's instructions to act out the process for the group. Again, point out how any mistakes or bugs are opportunities to improve the code. As the final step in the process, participants can share their code with others.
- You could choose to split the group into pairs instead of groups of 3 if you have an uneven number of participants, and have the librarian set up the map(s).
- If you have enough time, ask the participants to swap roles and try the activity again.

- If a participant is allergic to any of the food items, alter the food choices based on the participant's needs.

Assessment:

- Participants' instructions can be observed to assess understanding; did their steps become simpler and clearer as they gained practice in the PB&J warmup?
- Participants movements can be observed as assessment; able to successfully guide their peers to the goal? Were they able to fix any bugs along the way?

Credits:

- CuriosityCreek.com
- Code.org Curriculum https://curriculum.code.org/csf-18/courseb/1/

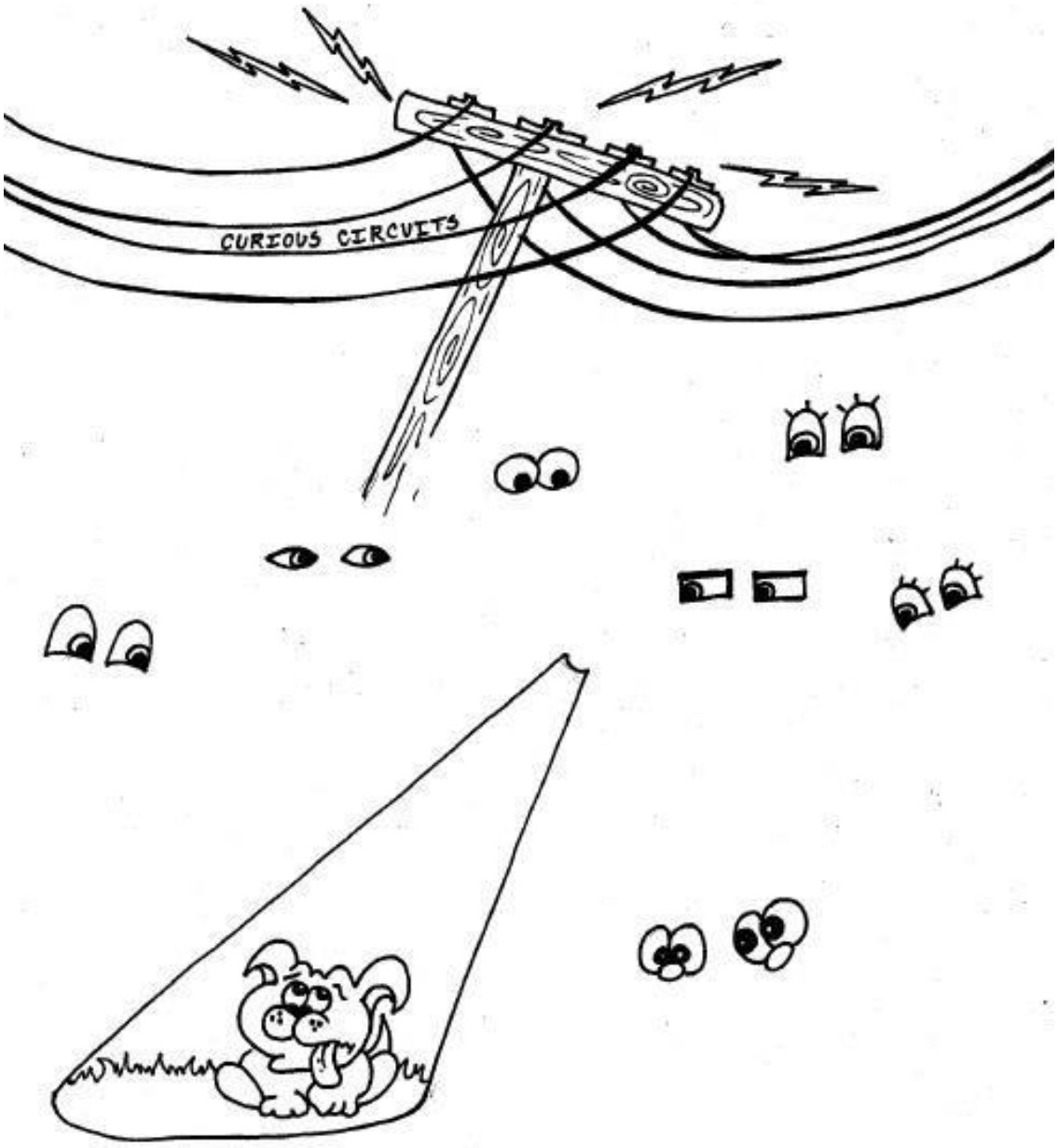
Family Literacy Element (ideas for at home follow-up):

- Librarians may reproduce this Code.org Take Home Worksheet that children can do with their parents at home to reinforce the activity and introduce the concepts to the adults.
    - Tell them "Now that you've imagined the Curious Kids programming their robot, you can use your newfound knowledge in lots of ways! Practice at home with this handout."
- Librarians should include the date and registration information for future programs.

Attachments: Curiosity Kid character guide, session-related handouts, activity sheets and/or take-home materials for parents - librarian responsible for the creation of take-home activities (optional)

- Code.org "Move it Move it" Debugging Handout
- Code.org "Move it Move it" Activity Handout
- Optional: "Move it Move it" Take Home Worksheet
- Optional: Watch the Code.org "Move it Move it" Video explaining the lesson

Inspiring Invention Through Stories
Program Session #2:
The Curious Kids and Circuits



Title: Curious Kids & Circuits

Topic: Engineering & Science/Electricity

Literacy Standards:

- CCSS.ELA-LITERACY.RL.1.5: Explain major differences between books that tell stories and books that give information, drawing on a wide reading of a range of text types.
- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Stephanie Prato

Target age range: Kindergarten-second grade; ages 5-8 years old

Number of participants: 10-12 participants - may accept more depending on available materials and staff.

Duration: 30-40 minutes

Problem-Based Scenario:

Oh no! There's a power outage at Curiosity Creek! The Curious Kids want to help. Hector knows a little bit about circuits and he thinks he can create a flashlight out of common household items. Can you help the Curious Kids design an LED flashlight to use as a light source during the power outage?

Brief Overview:

In this activity, participants will design and build their own LED Popsicle Flashlights out of common craft and office supplies. In the literary text, participants will read about a bird who learns about circuits. In the informational text (optional), participants can explore circuits. Then, thinking about the problem-based scenario with

the Curious Kids, participants will work independently to design and build their flashlights.

Essential Question: How can you use your knowledge of circuits to create a functional flashlight out of a few simple materials?

Big Ideas/Learning Outcomes:

- Participants will understand the basics of how electricity and circuits work.
- Participants will be encouraged to collaborate and share ideas before beginning a project.
- Participants will be able to build a working circuit.

Literary and/or Informational Text(s):

- Literary: *Oscar and the Bird*, by Geoff Waring *(or Meet Einstein*, by Mariela Kleiner*)*
- Non-Fiction & Informational: *What is a Circuit?*, by Ethan Weingarten (or *Electricity*, by Rebecca Olien) (optional)

Vocabulary:

- *Electricity* – a form of energy that is expressed as the movement and interaction of electrons.
- *Circuit* – the complete path of an electric current.
- *Electron* – the negative particle that causes electricity.

Content or Background Information:

- An electric circuit is like a pathway made of wires that electrons can flow through. A battery or other power source gives the force (voltage) that makes the electrons move. When the electrons get to a device like a light bulb, your computer, or a refrigerator, they give it the power to make it work.
- The word "circuit" sounds like "circle," and a circuit needs to be circular to work. The wires have to go from the power source to the device and back again, so that the electrons can go out and come back.
- Many circuits have a switch so that they can be turned on and off. When the switch is off, it makes a gap in the circuit and the electrons are not able to flow around. When the switch is turned on, the electrons are able to flow continuously in a circular path.
- It's helpful to set expectations before constructing the flashlights. These flashlights can be a bit temperamental and it's a good activity to practice resilience, as it may take a few tries and some debugging to get it right. In fact, it took Edison 1,000 unsuccessful attempts at inventing the lightbulb.
- Participants should be encouraged to discuss ideas before beginning construction. This will help them experience the "Imagine" and "Choose & Plan" steps of the design process.
- Background knowledge of Curiosity Creek and the Curious Kids will help, but is not entirely essential.

Materials and Preparation:

- Copies of the texts listed above
- Popsicle sticks (one per participant)
- Medium size metal binder clip (one per participant)
- 3V coin cell battery (CR 2032) - https://www.amazon.com/Energizer-2032-Battery-CR2032-Lithium/dp/B0042A9UXC
- LED (10mm LED, or standard LED) - https://www.sparkfun.com/products/11118
- Copper tape
- Non-conductive tape (masking, electrical, scotch, duct, etc.)
- Circuit worksheet (optional)

Procedures:

1. Welcome the group and, using the illustration from page 51, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. Explore the concept of a circuit using either the literary or the informational text, or both depending on the group's attention span. You can also use a worksheet like this one to introduce them to common components of a circuit.
3. Have the participants practice drawing a picture of a circuit using the correct symbols [INVESTIGATE]
4. Next, remind them of the scenario with the Curious Kids. How can they make a "flashlight" to help during the power outage, using only simple supplies? [WONDER]
5. Tell the participants the six materials they will receive (LED, popsicle stick, battery, binder clip, copper tape, regular tape). Have them brainstorm for 5 minutes. Ask individuals to share their ideas with the group.
6. Hand out the materials and begin making the flashlights [CONSTRUCT]:
    - First test your LED by touching the leads to the battery. The long cathode should be touching the positive side and the short cathode should be touching the negative side for the light to turn on. (If it doesn't work, just flip it!)
    - Take the binder clip and clip it on one end of the popsicle stick.
    - Measure and cut two lengths of copper tape (one for each side of the popsicle stick). The copper tape should be long enough to touch the metal of the binder clip when the sides are flipped down AND long enough to touch the LED leads, which will be placed on the other end of the popsicle stick.
    - Add the LED to the opposite side of the stick as the binder clip

    - Use the copper tape on top of the leads to secure the LED to the popsicle stick.
    - Add the battery on one side. When the metal part of the binder clip touches the battery on one side and the copper tape on the other side at the same time, the circuit is closed and the light should turn on!
    - You can use tape to help secure the battery on one side, just be sure that the metal part of the binder clip still has a secure connection.
7. Troubleshooting tips:
    - make sure you've got the LED leads touching their respective correct sides
    - make sure the copper tape is firmly adhered LED leads
    - make sure the battery is laying flat and touching the copper tape
    - make sure your non-conductive tape is not interrupting the connection
    - Reflect upon the process as a group. [REFLECT and/or EXPRESS]

Modifications for All Learners:

- There is a more complicated version of this activity using copper wire and hot glue on www.instructables.com The switch is more functional, but the activity requires more preparation in advance by the facilitator.
- For younger participants consider prepping the supplies beforehand. For example, pre-cutting the copper tape to the correct size.
- For younger participants, the construction phase may also be more guided by the instructor to cut down on frustration.

Assessment:

- Were participants able to successfully construct the flashlight?
- Did they find unique ways to add to or modify their design?
- How did participants reflect on their work and share it with the group?

Credits:

- CuriosityCreek.com
- Instructables: "LED Popsicle Flashlight"

Family Literacy Element (ideas for at home follow-up):

- Towards the end of the session, invite parents into the room to see what their children have made, and encourage students to explain the activity to their grown-ups.
- Librarians may produce a very simple handout with the following prompt:
    - *You may also want to submit your picture to submissions@curiositycreek.com to be featured on the CuriosityCreek website!*

- Librarians should include the date and registration information for future programs

Attachments: (Session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)
Worksheet: Electrical Symbols and Meanings

Inspiring Invention Through Stories
Program Session #3:
Bubble Boredom Begone

Title: Bubble Boredom Begone

Topic: Science & Geometry

Literacy Standards:

- CCSS.ELA-LITERACY.RL.1.5: Explain major differences between books that tell stories and books that give information, drawing on a wide reading of a range of text types.
- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Stephanie Prato

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: 10-12 participants - May accept more depending on available materials and staff.

Duration: 30-40 minutes

Problem-Based Scenario:

It's a Saturday afternoon and the Curious Kids are bored. Tanisha comes up with a fun idea; she is an artist and decides to make bubble art. The Curious Kids don't have any bubble wands, but Tanisha insists that with a little creativity and some household supplies, they can make their own! Can you help Tanisha design and create a bubble wand and save the Curious Kids from boredom?

Brief Overview:

In this activity, participants will learn about bubbles and geometry. Then, thinking about the problem-based scenario with the Curious Kids, they will individually design and create 2-3 types of geometric bubble wands. Finally, they can test the different shapes and designs to see which ones blow the best bubbles.

Essential Question: How can you use your knowledge of shapes to create a 3D bubble wand?

Big Ideas/Learning Outcomes:

- *Geometric shapes* - today we are learning about shapes in 3D. We will be looking at a triangle and a square and turning those 2D shapes into a pyramid and a cube.
- *Tensile Bubbles* - Tensile structures are formed when a material or cable is stretched and held in tension between two or more anchors; think suspension bridges or shade sails. Our bubbles have similarities to tensile structures because they are formed as the soapy solution is stretched both between the rigid edges of the wand and the joints that form in the bubble solution itself. (provide visuals)

Literary and/or Informational Text(s):

- Non-Fiction & Informational: *How to Make Bubbles*, by Erika L. Shores
- Literary: *Bubbles*, by Kit Chase (optional)

Vocabulary:

- *Tensile structures* - A tensile structure is a construction of elements carrying only tension and no compression or bending.

Content or Background Information:

- Participants will design three wands: one pyramid, one cube, and one design of their own.
- It may be helpful to let them test the first two wands, before designing and constructing their own version.
- Participants should be encouraged to discuss ideas for their unique designs before beginning construction. This will help them experience the "Imagine" and "Choose & Plan" steps of the design process.
- Remind children that bubbles are soap, and to be careful not to blow them in anyone's face or rub the solution in their eyes.
- Background knowledge of Curiosity Creek and the Curious Kids will help, but is not essential.

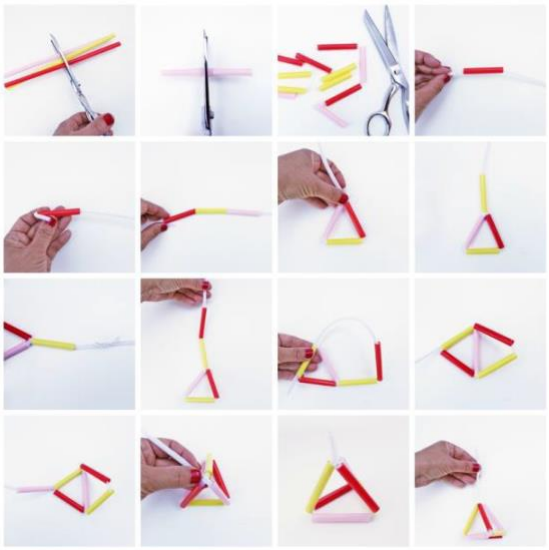
Materials and Preparation: (note: activity could be done indoors or outdoors depending on weather)

- Straight straws
- Pipe cleaners

- Bubble solution- homemade or store bought
- Tall Tupperware container

Procedures

1. Welcome the group and, using the illustration from page 57, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. Read the literary text about bubbles and have a conversation about what bubbles are and why they are fun. (optional) Is it possible to make bubbles in different shapes, like the ones seen in the story? Read the informational text to learn more about the science behind bubbles, then introduce the problem-based scenario with the Curious Kids. [CONNECT]
3. Discuss the different shapes you will be making and introduce the concept of tensile structures.
4. Hand out the materials and guide them through the steps for making the **pyramid shaped wand.** (Directions from babbledabbledo.com) [CONSTRUCT]
    - Cut your straws. First cut each straw in half, then cut in half again. You will get 4 straw sections from each straw.
    - Thread a pipe cleaner through one straw and bend the end of the pipe cleaner to secure it at the end.
    - Thread two more straws onto the pipe cleaner.
    - Bend the long end of the pipe cleaner back to meet the starting point and twist the two ends around each other.
    - Add two more straw sections onto the end of the pipe cleaner.*
    - Thread the pipe cleaner through one of the adjacent straw sections.
    - Add one more straw section and bend it back to one of the straw joints to form a pyramid.
    - Thread the pipe cleaner through an adjacent straw section to secure everything in place. If desired, add a straight section of straw onto the end of the pipe cleaner to form a handle.
    - *Add additional pipe cleaners as necessary and twist the ends together to secure.

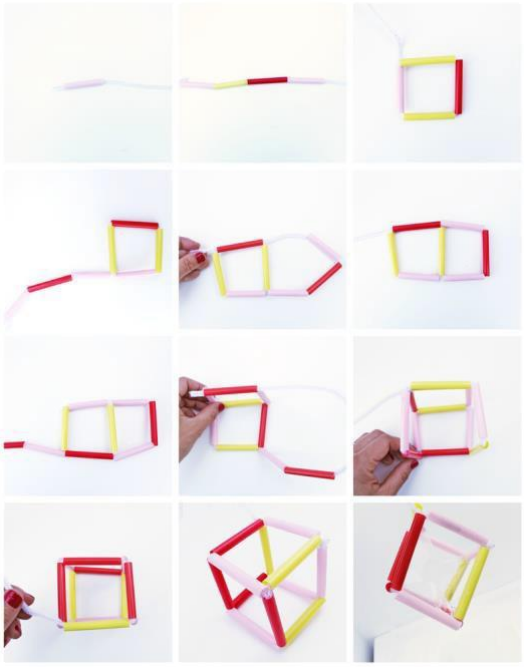


5. Next, try the cube shaped wand: (Directions from babbledabbledo.com)
    - Cut your straws. First cut each straw in half, then cut in half again. You will get 4 straw sections from each straw.
    - Thread a pipe cleaner through one straw and bend the end of the pipe cleaner to secure it at the end.
    - Thread three more straws onto the pipe cleaner.
    - Bend the long end of the pipe cleaner back to meet the starting point and twist the two ends of the pipe cleaner around each other. You will now have a square shape.
    - Add three more straw sections onto the end of the long pipe cleaner.*
    - Thread the pipe cleaner through one of the adjacent straw sections.
    - Add two more straw sections.
    - Bend the shape to form two sides of a cube and thread the end of the pipe cleaner through one of the straw sections on the edge of the cube.
    - Repeat step 8 to form another side to the cube.
    - Add one final straw section to complete the cube. Thread the pipe cleaner through an adjacent straw section to secure the final shape. If desired, add a straight section of straw onto the end of the pipe cleaner to form a handle.

* Add additional pipe cleaners as necessary and twist the ends together to secure

Credit

6. The final step is to make bubbles: (Directions from babbledabbledo.com)
    - Have a tall container full of bubble solution.
    - You can use homemade solution or store bought.
    - Carefully dip your wand into the solution; some frothy bubbles will form on the top of the solution as the straws are submerged. You can scoop them away with a spoon.
    - Now lift the wand out of the solution SLOWLY. You should see a multi-faceted bubble! If you don't, dip the wand into the solution again until you get an inverted bubble shape.



- Reflect upon the process as a group. [REFLECT and/or EXPRESS]

Modifications for All Learners:

- If you are running short on time, you may choose to cut out one of the designs to allow for more experimentation/playing with the bubbles.
- If you want to make the session longer, try making your own bubble solution recipe. A great one is linked above.
- For younger students consider prepping the supplies beforehand. For example, pre-cutting the straws.
- We recommend walking through the steps together as a group and waiting until the entire group has completed a step before moving onto the next one.

Assessment:

- Were participants able to successfully construct a 3D bubble wand?
- Was their own design unique and creative?

Credits:

CuriosityCreek.com
Ana Dziengel - https://babbledabbledo.com/science-engineering-kids-tensile-bubbles/

Family Literacy Element (ideas for at home follow-up):

- Towards the end of the session, invite parents into the room to see what their children have made, and encourage students to explain the activity to their grown-ups.
- Librarians may produce a very simple handout with the following prompt:
  - *You may also want to submit a picture of your bubble creations to submissions@curiositycreek.com to be featured on the CuriosityCreek website!*
- Librarians should include the date and registration information for future programs

Attachments: (Session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

Chapter 5: Program Sessions in the Marshlands

Inspiring Invention Through Stories
Program Session #4:
Tiny Creature Creators

Title: Tiny Creature Creators

Topic: Science - Biology: adaptations

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.1: Ask and answer such questions as *who, what, where, when, why*, and *how* to demonstrate understanding of key details in a text.
- CCSS.ELA-LITERACY.RL.2.2: Recount stories, including fables and folktales from diverse cultures, and determine their central message, lesson, or moral.

Next Generation Science Standards:

- LS1.A: Structure and Function - All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Nate Keefe

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: Ideal group size is 6-12 children and their caregivers. More than this may require multiple facilitators and dividing into smaller groups.

Duration: 60 minutes

Problem-Based Scenario:

The Curious Kids have found a portal in the Marshlands that leads to a world where they are all tiny--about the size of a mouse! While this is awesome, it poses challenges of its own. How will they safely explore this huge world? Luckily, Teenie Genie is able to create a creature "guide" to help them, but what should it look like and be able to do? The Curious Kids need your help to find out more about small and tiny animals, as well as design and build a model of the creature guide to help Teenie Genie understand what they need.

Brief Overview:

In this activity, participants and their parents will consider what characteristics

would be best for a creature who serves as a "guide" in a world where people have shrunk in size. After reading texts about adaptations of actual tiny animals and a literary text about a hybrid fictional animal, each participant will critically apply these ideas to create/craft their very own fictional animal that is best suited for a particular job. A reflection discussion at the end of the activity will give all participants the chance to share their creations and reflect on the process.

Essential Question/Problem: What makes an animal well-suited to a particular job in its environment?

Big Ideas:

- Participants will critically apply ideas from read-aloud texts to design and build novel creations of their own.
- Participants will reflect on their creations and generate ideas for future improvement.

Literary and/or Informational Text(s):

- Non-Fiction & Informational: *The Big Book of Giant Animals, The Little Book of Tiny Animals*, by Cristina Banfi and Cristina Peraboni (Illustrated by Francesca Cosanti)
- Literary: *Hello, My Name Is Octicorn*, by Kevin Diller and Justin Lowe (Illustrated by Binny Talib) (optional)

Vocabulary:

- *Adaptations* - a change or the process of change by which an organism or species becomes better suited to its environment.
- *Characteristics* - a feature or quality belonging typically to a person, place, or thing and serving to identify it.
- *Features* - a distinctive attribute or aspect of something.

Content or Background Information:

- This activity is based on the idea that all animals have physical and behavioral adaptations that help them survive in their respective ecosystems.
- Adaptations happen over millennia and many generations of natural selection, but participants and their parents will have the opportunity to mix and match adaptations for a single animal to help the Curious Kids in their exploration of this new world where they are tiny.
- Participants may choose what is important when designing their creature, and can be coached with questions. For example: Should the creature fly? Should it dig? Both? How many legs should it have (or not have)? What color should it be, and what size? What features would serve the Curious Kids best in their exploration?
- The more types of materials you have available for crafting, the more creatively participants will be able to express themselves!

- Background knowledge of Curiosity Creek and the Curious Kids will help, but is not entirely essential.

Materials and Preparation:

- Copies of the texts listed above
- Librarian will pull and stage on a table other age-appropriate informational texts from the library collection focused on tiny animals for participants to explore and research as they design their creature "guides," and inspire brainstorming and creativity.
- A wide variety and quantity of craft supplies for participants to create their own creatures, such as:

    - Toothpicks
    - Pipe cleaners
    - Craft sticks
    - Googly eyes
    - Craft foam
    - Toilet paper tubes
    - Construction paper
    - Glue and tape, glue gun/sticks if desirable
    - Scissors
    - Crayons
    - Paper plates (to build/place creatures on)
    - Pom-poms and/or cotton balls
    - Pom-poms and/or cotton balls
    - Handout for parents with at-home ideas (simple and self-created with library links/information to register for upcoming programs)

Procedures:

1. Welcome the group and, using the illustration from page 63, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. To help the group come up with ideas to help solve the problem-based scenario, read to them at least one of the non-fiction texts listed on page 65.
3. Brainstorm with the group what may be important features for the animal guide for the Curious Kids. Should they follow or ride on the creature? Will it be strong enough to lift things for them (like rocks), or small like them to squeeze into tight spaces? There are advantages and disadvantages to each of these characteristics. [WONDER]
4. Let's read a book about small animals, and their characteristics. Read *The Big Book of Giant Animals, The Little Book of Tiny Animals* aloud to the group. What are some features we learned about that might be good for the animal guide to have?
5. Your animal invention will be like no other, and you'll need to choose what makes it a perfect fit for its job with the Curious Kids. Let's read a book together about an animal like no other. Read *Hello, My Name Is Octicorn* aloud to the group. (optional) What

advantages does Octicorn have over other animals? What disadvantages does he have? [INVESTIGATE]

6. Share/point out staged informational texts on table for participants to explore and research about tiny animals as they generate ideas for their own creature guides.
7. Share the craft supplies with the group, as well as tools such as scissors and materials like glue and crayons. Give each child a paper plate to build their creation on, and remind parents that children should drive the creation, but their help may be needed to construct. [CONSTRUCT]
8. Provide ample time for creation!
9. When everyone has completed their design, reconvene the group for circle time and have participants share their creatures. Why did they design them the way they did? What would they do differently next time? This reflection is an important part of the innovation process, and encourages participants to think critically about their decisions. [REFLECT and/or EXPRESS]
10. Take pictures of each creation for the library--you may need these to promote your library's programming or as a basis for a future activity!

Modifications for All Learners:

- For a natural twist, have participants collect and use materials found in nature! Pinecones, seeds, leaves, sticks and other items would add a wonderful dimension to their creation, and get them outside in nature. These items could also be brought into the library to save time.
- It may be desirable to choose flat craft supplies for a younger audience that may have a hard time constructing a three-dimensional creature. This flat creation may be built on cardstock.

Assessment:

- Participants' creations may be observed to assess understanding; diversity and creativity are two factors that will be important.
- Participants' reflection on the process and justification of characteristics included will be observed to determine grasp of innovative and design thinking.

Credits:

CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- Librarians may produce a very simple handout with the following prompt:
    - *Now that you've imagined the Curious Kids are tiny, instead imagine that they entered a world in which they are huge--the size of elephants! What would be different about the guide animal they would have to design for Teenie Genie to create? Draw your creation below, and share it with us the next time you visit the library!*
    - *You may also want to submit your drawing to submissions@curiositycreek.com to be featured on the CuriosityCreek*

website!

- Librarians should include the date and registration information for future programs

Attachments: (Session-related handouts/activity sheets and/take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

Inspiring Invention Through Stories
Program Session #5:
Bionic Beaks

Title: Bionic Beaks

Topic: Engineering, Science, Social Emotional Learning

Literacy Standards:

- CCSS.ELA-LITERACY.RI.3.3: Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
- CCSS.ELA-LITERACY.RI.3.7: Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).
- CCSS.ELA-LITERACY.RI.4.3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
- CCSS.ELA-LITERACY.RI.5.3: Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Leslie Pcolinsky

Target age range: Kindergarten - third grade; ages 5-8 years old

Number of participants: This activity is designed for pairs and can accommodate up to 20 patrons.

Duration: 60 minutes

Problem-Based Scenario:

The Curious Kids and Mimi are on a nature hike. They are down by the stream where they run across a blue heron with an injured wing and an injured beak. The Curious Kids ask Mimi if they can rescue the injured blue heron and rehabilitate it for release into the wild again. Mimi just happens to know the name of a local wildlife rehabilitation specialist and gives her a call. The gang goes to the wildlife rehabilitation center where the team comes together to brainstorm some possible solutions to help the blue heron fly again.

Brief Overview:

Bionic Beaks introduces patrons to America's national bird, the bald eagle, *Haliaeetus leucocephalus.* Beauty the bald eagle has been injured and needs help from wildlife biologists and engineers to repair/replace part of her beak. During this session, participants will learn how scientists and engineers use technology to design and 3-D print body parts.

The librarian will read two books (optional): a literary book about invention and an informational text about a bald eagle whose beak has been injured and needs replacement. Participants will then have their own chance to create a prosthetic device.

Participants will be able to design and build their own replacement body part for their favorite animal, pet, or stuffed animal. Participants will have access to a variety of materials to create a prosthetic device. Participants may have to create more than one design to create the best prosthetic.

Essential Question/Problem:

- How does an injured body part affect an animal in the wild?
- What can humans do to help injured animals survive in their habitat or in captivity?

Big Ideas:

- Participants will learn how scientists and engineers use technology to design and 3-D print an injured, missing, or undeveloped body part.
- Participants will apply the steps of the engineering design process to design and build a prototype prosthetic for an animal of their choice.
- Participants will reflect on their experience designing and building with the members of the group.
- Engineering as a way to help animals survive and prosper in captivity and in their natural habitats.

Literary and/or Informational Text(s):

- Literary: *Papa's Mechanical Fish*, by Candace Fleming (Illustrated by Boris Kulikov)
- (optional) Non-Fiction & Informational: *Beauty and the Beak: How Science, Technology, and a 3D-Printed Beak Rescued a Bald Eagle*, by Deborah Lee

Rose and Jane Veltkamp

Vocabulary:

- *Prosthetic* - denoting an artificial body part, such as a limb, a heart, or a breast implant.
- *Adaptation* - the action or process of adapting or being adapted.
- *Raptor* - a bird of prey, e.g., an eagle, hawk, falcon, or owl.
- *Engineer* - a person who designs, builds, or maintains engines, machines, or public works.
- *Biologist* -an expert in or student of the branch of science concerning living organisms.
- *Ecosystem* -a biological community of interacting organisms and their physical environment.
- *Habitat* - the natural home or environment of an animal, plant, or other organism.
- *Conservation* - preservation, protection, or restoration of the natural environment and wildlife.

Content or Background Information:

- The scenario for this activity is based on real world engineering and design that is being done using 3-D printing.
- Some knowledge of raptors and how they hunt.
- Background knowledge of the engineering and design process which can be found here: Engineering and Design Process
- Knowledge and ability to lead using inquiry methods which can be found here: Stripling's Model of Inquiry

Materials and Preparation:

- Copies of the texts listed above
- Librarian will stage (on a table) other age-appropriate texts from the library collection focused on engineering and design, wildlife, wildlife rehabilitation, 3-D printing and technology.
- Wide variety of materials for prosthetic construction. The more diversity in materials you have, the better! Suggestions include:
    - Scissors
    - Construction paper, newspaper
    - Tag board
    - Duct tape, scotch tape, packing tape
    - Wire
    - Wooden dowels
    - Paper towel/toilet paper tubes
    - Egg cartons
    - String
    - Pipe cleaners
    - Popsicle sticks

    - Aluminum foil
    - Play dough
    - Rubber bands
    - Other materials as needed or items that patrons may ask for
- Resist the temptation to create a prototype for patrons to see. They will need to be creative and solve problems as they develop their ideas.
- Handout for parents with at-home ideas (simple and self-created with library links/QR codes/information to register for upcoming programs).

Procedures:

1. Welcome the group and, using the illustration from page 69, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. Begin the session by showing this 8 minute video about Derby, a dog who has underdeveloped legs and needs something to replace his cart that he uses to move around. It shows how **engineers** develop **prosthetic** legs for Derby and other animals. [CONNECT]
3. Brainstorm some ideas about other types of prosthetics to assist animals.
4. We are going to read two books to help the group come up with ideas to solve the problem-based scenario (optional). One is literary fiction and the other is an informational text. Review the difference between the two types of books. [WONDER]
5. The first book is literary fiction. The title is *Papa's Mechanical Fish* and it's about a man who loves to invent things.
6. Let's read a book about a **raptor** called Beauty who was injured by a gunshot and how **engineers** and **biologists** worked to help her. Think about some of these questions as we read *Beauty and the Beak* (optional - you may choose another informational text to help participants understand more about injured wildlife):
    - How does a Bald Eagle use its beak for survival?
    - What does a Bald Eagle eat?
    - How was the 3D printer used to help Beauty?
    - How did they know if the 3D printed beak worked?
7. Using the materials provided, design and build a prosthetic device to help a pet, or stuffed animal that needs fixing. [CONSTRUCT]
8. Think about the design, will it be useful and suit the purpose? What changes could you make to improve on the design? Talk about it with your partner.
9. Share your prosthetic with the group and tell them what your inspiration was for the design! [REFLECT and/or EXPRESS]
10. Take pictures of each prosthetic for the library--you may need these to promote your library's programming or as a basis for a future activity! Share on social media.

Modifications for All Learners:

- If you have a 3-D printer to use you could employ TinkerCad and patrons could design and print their prosthetic using those methods.
- Allow patrons to work alone if they would like.
- For younger audiences, it may be helpful to offer fewer materials for prosthetic construction.

Assessment:

- Observation of design/iteration that goes into participants prosthetic devices will demonstrate an understanding of the engineering design process as well as provide insight on the creative process.
- Participants' reflection on the process will reveal grasp of design thinking.

Credits:
CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- Librarians may produce a very simple handout with the following information for extension at home:
    - *Go to Cornell Lab of Ornithology's website to hear bald eagle vocalizations, learn how to identify bald eagles and watch a video of bald eagles fishing, and more.*
    - *Find a "live cam" of a bald eagle's nest and follow them through a nesting season.*
    - *Check out this resource Wild Engineering: Creating Habitats for more inspiration.*
    - *Share how your invention worked on the library's social media!*
- Librarians should include the date and registration information/link/QR code for future programs

Attachments: (Session-Related Handouts / Activity Sheets and/or or Take-Home Material for Parents) - librarian responsible for the creation of take-home activities (optional)

Chapter 6: Program Sessions at the Fishing Dock

Inspiring Invention Through Stories

Program Session #6:

Hector's Mechanical Animals

Title: Hector's Mechanical Animals

Topic: Science and Engineering – Nature

Literacy Standards:

- CCSS.ELA-LITERACY.RL.K.7: With prompting and support, describe the relationship between illustrations and the story in which they appear (e.g., what moment in a story an illustration depicts).
- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges.
- CCSS.ELA-LITERACY.RL.3.3: Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events

Next Generation Science Standards:

- 1-LS1-1 From Molecules to Organisms: Structures and Processes - Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Katherine McGinnis

Target age range: Kindergarten - fourth grade; ages 5-11

Number of participants: 15 to 25 (can be more or less depending on available materials)

Duration: 60 minutes (can be adapted for more or less time)

Problem-Based Scenario:

One summery day at Curiosity Creek, the Curious Kids found themselves in a bit of a situation. A frazzled Mimi has revealed that Hector has gone missing! After much investigation, Mac, the information detective, has discovered his whereabouts. The only problem is getting there. Puzzled, the Curious Kids listen intently. Mac reveals that Hector has once again created an outstanding invention that only "half-worked". He invented a machine that would allow him to experience life under the water, just like his dear friend, Figgy the Flying Fish! However, while at first successful exploring the depths of Curiosity Creek, a nearby Bald Eagle swooped down and snatched Hector's mechanical fish, along with Hector! While Hector remains safe inside his invention, there isn't much time, as he is stuck atop the Bald Eagle's nest far above Curiosity Creek in a tall tree. Not sure what to do, the Curious Kids call on Teeny Genie for help. Teeny Genie reveals that if he is given a plan for an invention that mimics an animal he could make it real, so that the Curious Kids could drive the animal invention, just like Hector did. Teeny Genie explains that this invention must be of an animal that could save Hector, so choose wisely. But what animal could possibly reach Hector, who is so high in the trees? The Curious Kids need your help!

Brief Overview:

In this activity, participants and parents will be faced with a problem requiring them to think about how to execute a specific task. Participants are given a challenge to help a fellow Curiosity Creek character who is stuck in a sticky situation. Not only must they reach the specific character, but also retrieve him, defend themselves, and return home safely. Participants will not only have to consider the location of the character, but also specific animal characteristics and attributes that may help them complete the mission successfully. After choosing an animal, participants will design a mechanical version of that animal that will help them rescue the Curiosity Creek member. Participants will have to think about design and specific functions within the design to help them perform various tasks while on the mission. Participants will share their designs and compare inventions to better reflect upon the creative process.

Essential Question/Problem: What animal would be best suited for reaching high places, defending oneself, and tactical retrieval of something important?

Big Ideas:

- Participants will relate to Hector's story by listening to the read-aloud *Papa's Mechanical Fish*.
- Participants will identify problems and solutions in the read-aloud *Papa's Mechanical Fish* to assist them in designing a mechanical animal of their own.

- Participants will identify a mechanical animal to design based on brainstorming sessions involving animal characteristics and attributes.
- Participants will create mechanical animal designs and explain how and why they could save Hector.
- Participants will reflect on their chosen designs during discussion and give/receive feedback for improvement.

Literary and/or Informational Text(s):

- Literary: *Papa's Mechanical* Fish, by Candace Fleming, Illustrated by Boris Kulikov
- (optional) Non-Fiction & Informational: *Hidden World: Forest*, and/or *Hidden World: Animals*, by Libby Walden, Illustrated by Stephanie Fizer Coleman

Vocabulary:

- *Animal characteristics/features/abilities/habits/attributes* - features that define the animal
- *Mechanical* - working or produced by machines or machinery
- *Design* - a plan or drawing produced to show the look and function or workings of something
- *Schematic/sketch* - a diagram, representation, or plan - symbolic and simplified

Content or Background Information:

- This activity is based on the idea that there are multiple solutions (animals) for solving this problem.
- Participants and parents will choose an existing animal and explain which characteristics make it possible to solve this problem (they may not come up with a fictional animal).
- While participants may not come up with a fictional animal they may choose to include attributes in their **mechanical design** that enhances pre-existing attributes of their chosen animal.
- Participants will brainstorm things they need to know about their "rescue animal" to be sure it can save Hector. They can do this as a whole group or in small groups. After sharing aloud, the librarian will fill in missing questions participants should consider to help make their decision of which animal to choose to solve the problem. For example:
    - What kind of animal can reach the top of the tree?
    - Can it fly?
    - Can it climb?
    - Can it knock the tree down?
    - Can this animal defend itself?
    - How can it defend itself?
    - Can the animal successfully pick up the mechanical fish with Hector inside?
    - Can it keep it safe?

    - How will it get down?
    - How does it travel?
    - How will you design the **mechanical** version of this animal to make sure its attributes can "function" correctly?
- Various materials should be included. Students may choose to create a **schematic/sketch** of their design or even build a prototype. The more supplies that are available the better.
- For maximum understanding participants should have a background of The Curious Kids from Curiosity Creek. This will enhance the lesson and further engage the kids, as they will feel like they are a part of the story and of course the "mission" to save Hector.

Materials and Preparation:

- Copies of the texts listed above – You may choose to have multiple copies of the informational texts for participants to look through on their own when researching which animal to choose for the challenge. This will help them explore further and get a more hands on experience.
- A variety of construction supplies to build a prototype if they wish. Others may choose to sketch their invention. However, some may want to take a more hands on approach to their mechanical animal. Include the following items if possible (but not limited to):
    - Glue and tape, glue gun/sticks, if desirable
    - Scissors
    - Crayons/paint/colored pencils
    - Toilet paper tubes/other cardboard materials
    - Construction paper
    - Blocks/scrap wood pieces
    - Pom-poms/cotton balls/styrofoam
    - Toothpicks/popsicle sticks
    - Pipe-cleaners
    - Googly eyes/decorative materials
    - Handout for parents with at-home ideas (simple and self-created by the librarian with library links/information to register for upcoming programs)

Procedures:

1. Welcome the participants and start the session by explaining that The Curious Kids have gotten themselves into a sticky situation. Introduce the problem-based scenario. If participants have never before heard of Curiosity Creek, some of the characters may need to be introduced. This will engage the participants and help them relate to the characters when completing the mission. [CONNECT]
2. After hearing their situation, to help the group come up with ideas to help solve the problem-based scenario, read to them at least one of the texts listed on page 47.

3. Imagine with the participants what it would be like to travel on or within a mechanical animal. What would it be like? Depending on the animal the participants may come up with a variety of answers.
4. Before brainstorming possible solutions, help participants imagine what this adventure would be like by reading the book *Papa's Mechanical Fish* by Candace Fleming. Why did this character decide to build this mechanical fish? Do you think Hector had similar reasons? Why or why not? What does the character in this book plan to build next? What could go wrong?
5. Participants will then brainstorm possible solutions to this problem. They should ask themselves what kind of animal would be best to solve this problem and rescue Hector: What kind of animal can reach the top of the tree? Can it fly? Can it climb? Can it knock the tree down? Can this animal defend itself? How can it defend itself? Can the animal successfully pick up the mechanical fish with Hector inside? Can it keep it safe? How will it get down? How does it travel? How will you design the mechanical version of this animal to make sure it's attributes can "function" correctly? [WONDER]
6. (optional) After an initial brainstorming session share the books *Hidden World: Forest* and/or *Hidden World: Animals* by Libby Walden, illustrated by Stephanie Fizer Coleman to help them brainstorm different solutions to this problem. [INVESTIGATE]
7. Participants will then plan their mechanical animal design in the form of a **schematic/sketch**. To create this they may have to complete a couple of drafts. They may choose to add words to describe specific parts of their mechanical animal, or simply explain this aloud during the sharing session. Participants can then name their invention based on its abilities or animal characteristics. The instructor may also choose to give an example or share his or her own at the end, as not to interfere with participants designs. To enhance this activity, you may choose to have various construction materials available for participants to actually build their mechanical animal in a prototype version. Parents may be able to assist in this portion of the session (helping with supply management, not necessarily building the prototype, as that should be solely student created). This portion of the session will take the most time! [CONSTRUCT]
8. When everyone has completed their design/prototypes gather as a whole group and have participants share their creations. What animal did you choose and why? Reflect on the choices participants made and how they believe they could save Hector. Participants may choose to tell the ending of the story and how their mechanical animal ended up saving Hector! This story telling session will not only help participants reflect on their own process, but also help them compare their choices with others.
9. End this session with participants pairing up and discussing what they could have done differently to improve their design. [REFLECT and/or EXPRESS]
10. Be sure to record session experiences, including but not limited to participant quotes, pictures, invention designs, etc. and share them on the library's website to promote future sessions.

Modifications for All Learners:

- This session was designed for participants to choose whether they wanted to create a 2D design and/or 3D design. However, you may choose for participants and limit materials based on whether you want them to create only a sketch. This may be easier for younger participants who may struggle with construction.
- You may also choose to print out visuals of the Curiosity Creek characters to help participants visualize the problem/mission, including the character descriptions of each character.

Assessment:

- Participants' designs/prototypes may be observed to assess understanding (creativity, development, chosen animal, etc.)
- Participants' reflection on the process, including story development (finishing the story and explaining how they completed the mission) and the reasoning behind their chosen animal (including abilities, defense mechanisms, and retrieval techniques) will help evaluate participants based on the design process, as well as their problem-solving techniques.

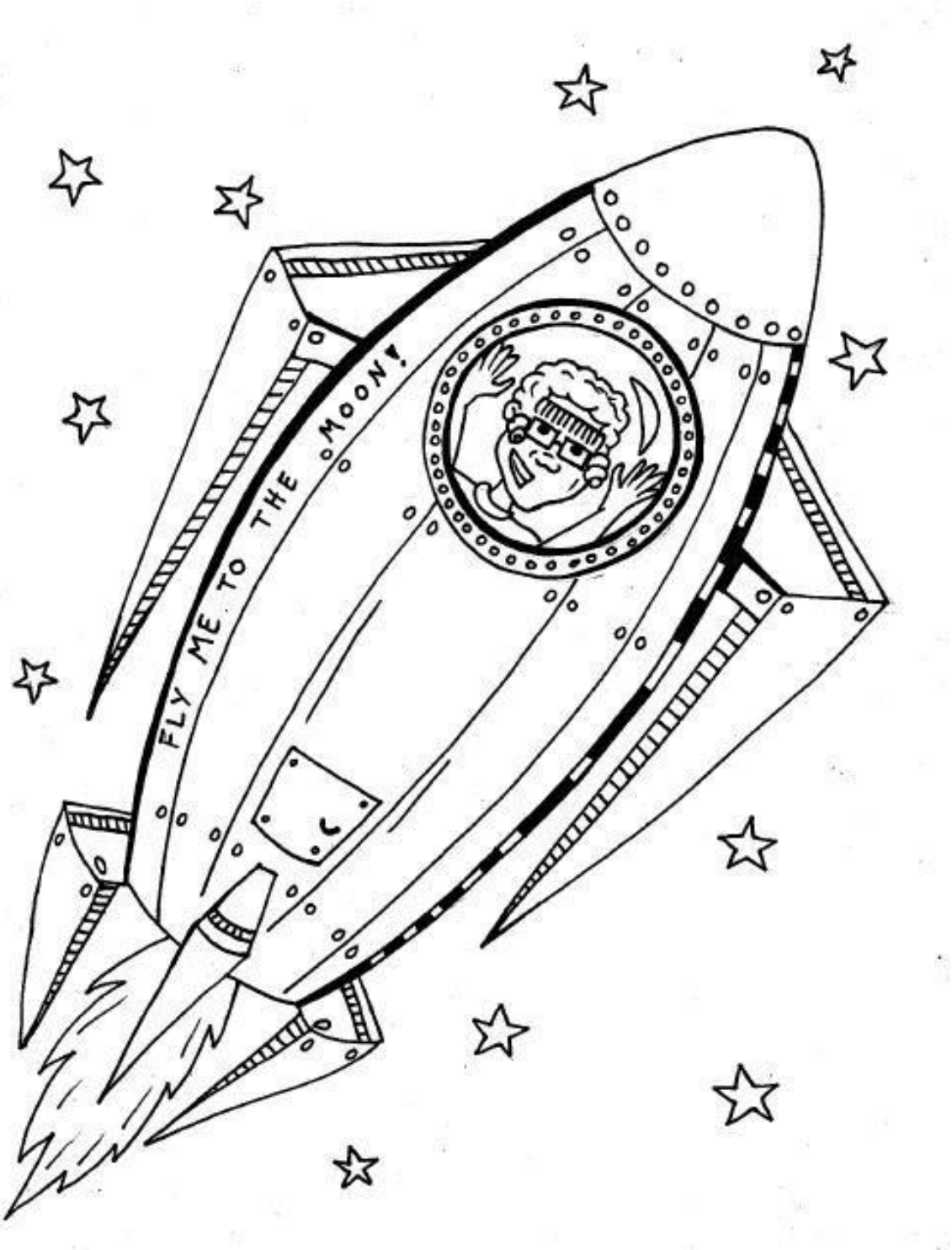
Credits:
CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- *Extended Learning:* Imagine Hector did not invent a mechanical fish, but rather a mechanical fly who mistakenly flew into a spiders web! How would you have to change your invention? Would you keep the same mechanical animal or create a new one?
- *Submit your invention sketch to submissions@curiositycreek.com to be featured on the Curiosity Creek website!*
- Include registration information for future sessions

Attachments: Curiosity Kid character guide, Session-Related Handouts, Activity Sheets and/or Take-Home Materials for Parents - librarian responsible for the creation of take-home activities (optional)

Inspiring Invention Through Stories
Program Session #7:
Fly Me To The Moon



Title: Fly Me To The Moon

Topic: Math, Engineering, and Physics

Literacy Standards:

- CCSS.ELA-LITERACY.SL.1.1: Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
- CCSS.ELA-LITERACY.SL.1.1.A: Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion).
- CCSS.ELA-LITERACY.SL.1.1.B: Build on others' talk in conversations by responding to the comments of others through multiple exchanges.
- CCSS.ELA-LITERACY.SL.1.1.C: Ask questions to clear up any confusion about the topics and texts under discussion.

Next Generation Science Standards:

- K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Leslie Pcolinsky

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: Patrons can work independently or in pairs. Each session can accommodate up to 20 participants.

Duration: 40 - 50 minutes

Problem-Based Scenario:

The Curious Kids are making observations around the fishing dock. They notice frogs jumping over different obstacles and grasshoppers hopping through the grass. Both of these organisms jump or hop in an arc or parabola. They come up with ideas about what kind of device will launch their minifigures from the Women of NASA Lego set the furthest. This leads them into a discussion about space and spaceships. The Curious Kids want to know more about rockets, space, and how rockets can follow a specific course. They have been noticing patterns along their travels. They keep finding many arcs, or curved paths and structures. How can they help design a spaceship to accurately land on a target? They start to explore and gather materials from each other's backpacks and from the clubhouse. Working together they create a few model rockets and give each other suggestions along the way for success.

Brief Overview:

This activity will focus on children identifying parabolas in their environment and then designing/building a balloon rocket that lands on a specific target. This will require children to assess and redesign their rocket to hit a target with accuracy. Participants will listen to two (optional) literary/biographical texts; One about a mathematician, and another about the first computer programmer. In this activity, participants will design, construct, and test a balloon rocket that will fly along a trajectory to hit a specific target. Participants will brainstorm ways to create a rocket that will meet the specifications to hit a target. Participants will choose from the materials provided to create a rocket that will help the Curious Kids solve a problem. Participants will test their rockets and provide verbal feedback to one another on their rockets.

Essential Question/Problem: How can you build a rocket to follow a trajectory and hit a target?

Big Ideas:

- Participants will use knowledge gained from texts to inspire a creation to solve a problem.
- Participants will select materials and construct a rocket to hit a target.
- Participants will test rockets, reflect, and share feedback for improvement.

Literary and/or Informational Text(s):

- Non-Fiction & Informational: (Biography) *A Computer Called Katherine: How Katherine Johnson Helped Put America on the Moon*, by Suzanne Slade, Illustrated by Veronica Miller Jamison
- (optional) Further Non-Fiction & Informational: *Ada Lovelace, Poet of Science: The First Computer Programmer*, by Diane Stanley, Illustrated by Jessie Hartland

Vocabulary:

- *Parabola* - a symmetrical open plane curve formed by the intersection of a cone with a plane parallel to its side. The path of a projectile under the influence of gravity ideally follows a curve of this shape.
- *Trajectory* - the path followed by a projectile flying or an object moving under the action of given forces.
- *Rocket* - a cylindrical projectile that can be propelled to a great height or distance by the combustion of its contents, used typically as a firework orignal.
- *Target* - a mark or point at which someone fires or aims, especially a round or rectangular board marked with concentric circles.

Content or Background Information:

- The scenario for this activity is based on scientific experimentation, observation, and iteration. Additional concepts include Newton's Third Law of Motion (For every action, there is an equal and opposite reaction).
- Mathematicians and physicists use complicated mathematical formulas and calculations to successfully tackle problems such as designing a rocket to travel to the moon.
- Models and simulations are used to collect preliminary design data for the rockets.
- Parabolas are curves that are considered "mirror-symmetrical" and are U-shaped.
- Background knowledge of Curiosity Creek and the Curious Kids will help, but is not entirely essential.

Materials and Preparation:

- Copies of the texts listed above
- Librarian will have other age-appropriate texts available for check out from the library collection. The texts will focus on mathematicians, space flight, invention, computational thinking, coding, and innovation. These will inspire brainstorming and creativity, as well as be available for check out after the session.
- Materials for construction. Can be limited to this list, or added to at your discretion.
    - Paper of different thicknesses - tissue paper, printer paper, cardstock, construction paper
    - Balloons of different sizes
    - String
    - Scissors
    - Pencil
    - Measuring tape or ruler
    - Drinking straws
    - Scotch tape/glue/glue sticks
    - Duct tape
- Allow patrons to be creative and unique in their designs. Ask guiding questions as designs are created.

- Handout for parents with at-home ideas (simple and self-created with library links/QR codes/information to register for upcoming programs)

Procedures:

1. Welcome the group and, using the illustration from page 82, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. Introduce parabolas or u-shaped curves. Ask participants to think of curves in their home, school, or play environment. [CONNECT]
3. The Curious Kids want to create a rocket prototype to present to their teacher as a part of their study of the moon and space travel.
4. Read *A Computer Called Katherine: How Katherine Johnson Helped Put America on the Moon* by Suzanne Slade, Illustrated by Veronica Miller Jamison, and ask for participant feedback. What are their thoughts on this mathematician? Did she face any challenges? What were they? [INVESTIGATE]
5. (Optional if available) Read *Ada Lovelace, Poet of Science: The First Computer Programmer* by Diane Stanley, Illustrated by Jessie Hartland. Ask for participant ideas: What was unique about Ada Lovelace? Why would someone write a book about her? What is the importance of computers and following a pattern or sequence of directions? [WONDER]
6. The Curious Kids are working with their teacher on an integrated math/science/literacy project. They are learning about **parabolas** in their daily lives and about how **rockets** follow a **trajectory** to land on a specific **target**.
7. Give participants time to devise several iterations of rockets until they have one that comes close to hitting their targets. Show this video SciShow Kids Balloon Rockets for inspiration or encouragement and to demonstrate Newton's Laws. [CONSTRUCT]
8. At the end of the session, allow participants to measure how far their rockets can travel and hit a target. There may be some time for a little competition.
9. Discuss and reflect on the process. Ask participants to fill out an exit ticket that addresses one of the following questions: [REFLECT and/or EXPRESS]
    - Which of your rockets traveled the furthest?
    - Which of your rockets came closest to the target? Why?
10. Document and share on social media (with parent permission) to advocate for your library and show the community what is happening in your space.

Modifications for All Learners:

- If time permits, the librarian may wish to read *Hidden Figures: The True Story of Four Black Women and the Space Race* by Margot Lee Shetterly with Winifred Conkling and illustrated by Laura Freeman.
- The library may purchase the Women of NASA Lego set or sets depending on funding.
- For younger audiences, it may be helpful to offer fewer materials and more guidance as needed. Parent or older sibling involvement may be very helpful. If

participants are getting discouraged with their design efforts, encourage them and provide some assistance. Parents are encouraged to join in.

Assessment:

- Observation of design/iteration that goes into participant rockets will demonstrate understanding of trajectories and mathematical problem-solving as well as provide insight on the creative process.
- Completed rockets will serve as an example of creativity and innovation, and will provide participants with the opportunity to immediately test effectiveness.
- Participants' reflection on the process will reveal grasp of innovative thinking.

Credits:

CuriosityCreek.com
Adapted from an idea found at Scientific American - Build a Rocket

Family Literacy Element (ideas for at home follow-up):

- Librarians may produce a very simple handout with the following prompt:
    - *Share your rocket design with friends or grandparents. How well does your rocket fly? How can you expand on the process for a more accurate model? How do engineers design rockets?*
    - *Make adjustments to your rocket with things you have around the house and re-test! Hint: What if you added weight (a payload)?*
    - *Share how your invention worked on the library's social media!*
- Librarians should include the date and registration information/link/QR code for future programs

Attachments: (Session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

Inspiring Invention Through Stories
Program Session #8:
1 Thing, 2 Things, Nature Things, Tree Rings

Title: 1 Thing, 2 Things, Nature Things, Tree Rings

Topic: Nature Scavenger Hunt & Dendrochronology

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges.
- CCSS.ELA-LITERACY.SL.1.4: Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

Next Generation Science Standards:

- ESS2: Biogeology: Plants and animals can change their environment.
- ESS3: Natural Resources: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Gabby Fountain

Target age range: Second - fourth grade; ages 7-10 years old

Number of participants: 15-20 participants

Duration: 60 minutes

Problem-Based Scenario:

Figgy the Flying Fish found part of a stump floating in the creek. Mimi realized that there were a lot of questions and jumped at the chance to learn more. She brought it to the Curious Kids attention. What can this tree tell us about its life? Using dendrochronology, the Curious Kids dive into what the tree rings say about the trees life and what it endured. How can the Curious Kids become careful observers of wildlife for the future?

Brief Overview:

In this activity, children will learn how to become careful observers of wildlife and nature. Participants will experience a nature walk and learn how to observe without destroying any of nature's wonders. Participants will then learn more about the kinds of elements trees have to endure to continue to thrive and grow. Participants will then draw/paint the stump of a tree and create a story explaining the reason behind its rings.

Using background knowledge, as well as newly learned vocabulary words, the participants will learn not only how to say dendrochronology but also be able to do it.

Essential Question: What can a tree tell me about its life?

Big Ideas:

- Children will learn about careful observation in wildlife.
- Children will learn about dendrochronology (meaning and process).
- Children will apply their ideas to draw, create, and explain the lifespan of a tree.
- Children will reflect on their creations and generate ideas on how to help future tree growth.

Literary and/or Informational Text(s):

- Non-Fiction & Informational: *The Tree Book for Kids and Their Grown-Ups*, by Gina Ingoglia. *Trees, Leaves & Bark*, by Diane Burns. *A Tree is a Plant*, by Clyde Robert Bulla.
- Fiction & Literary: *Stuck*, by Oliver Jeffers. *Maple*, by Lori Nichols. *If You Hold a Seed*, by Elly MacKay. *The Giving Tree*, by Shel Silverstein.

Vocabulary:

- *Dendrochronology* (den-dro-chro-nol-o-gy) is the scientific process of using tree rings (or growth rings) to understand what happened in the environment during the life cycle of a tree.
- *Tree rings* are the number of circles beginning with smaller ones near the center of the tree and expanding into larger circles towards the bark.
- *Heartwood* is the dark center area of the tree. It's actually dead layers of the tree that have filled with sap but serves as a pillar of the tree and keeps it upright.
- *Sapwood* is the lighter area, which is newer growth. These layers are how the tree gets water it its' leaves.

Content or Background Information:

- A tree adds new layers of wood each spring and summer.
- Wood added in the spring grows faster and is lighter.
- Wood added in the summer (and fall) grows slower and appears darker.
- In order to date a tree, you should count the **dark** rings on a tree's stump once it's cut down.
- Be sure to count the rings at the widest area of the stump.

Materials and Preparation:

- Tree stumps or chunks of trees (ask around town, city parks, farmers - If you can't find an actual tree stump, look at the attached posters or listed books provided for examples).
- Magnifying glasses or magnifying sheets
- Tree identifying posters

- Clipboards
- Paper, markers, crayons, colored pencils, paints, etc.

Procedures:

1. Welcome the group and, using the illustration from page 88, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. To help the group come up with ideas to help solve the problem-based scenario, read to them at least one of the texts listed on page 90.
3. Show examples of tree stumps and have children guess how old they are? Ask also if they could tell you a story about the life of the tree.
4. Write *dendrochronology* and practice pronouncing (den-dro-chro-nol-o-gy) with the children. Explain the definition. [CONNECT]
5. Work through the background information and other vocabulary words so all have shared meaning.
6. Brainstorm how we can be careful observers in wildlife - the do's and don'ts. [WONDER]
7. Provide tree ring posters (see attachments), magnifying glasses, pencils, and clipboards. Go outside on a nature walk - time depends on number of children attending and location of walk. [INVESTIGATE]
8. Find examples of tree stumps either on the walk or have examples available in the library to work through assessment questions.
9. Once gathered back as a group, allow children time to brainstorm a backstory of the life of a tree.
10. Give children art supplies and have them create their own tree stump. Have them write their backstory down. Allow ample time for students to share with others. [CONSTRUCT]
11. Display artwork and stories around library. Also display brainstorming ideas on how to be better observers in nature. [REFLECT and/or EXPRESS]

Modifications for All Learners:

- If the weather is bad, ages are too young, or terrain is too rocky/not handicap accessible for a nature walk, have pictures of what to do & what not to do on a nature hunt.
- Supply magnifying glasses/sheets and posters so everyone knows what to look for.
- Take time to pronounce *dendrochronology* (den-dro-chro-nol-o-gy) together.
- If going for a nature walk takes too much time, have examples of stumps available to use in the library.
- Use a sharpie to outline on the stump the rings that they should count for an example.
- Make a list of things that you should and shouldn't do in the wildlife. "How can you be a careful observer in the wildlife?" Let the young ones brainstorm, but prompt on certain behaviors if they get sidetracked.

Assessment:
While looking at the tree stumps, ask questions:

1. Did your tree survive a drought?
2. Was your tree leaning to one side when it was alive?
3. Was there a fire in the forest?
4. Was the weather better when your tree was young or old?
5. How old was your tree?
6. As a group brainstorm ideas on how we could be better observers of wildlife.

Credits:
www.kcedventures.com
CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- Provide nature scavenger hunts for families to do together.
- Set out different types of tree books.
- Set out leaves for children to look at with magnifying glasses.

Attachments: (Session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

- Reading the Rings of a Tree - http://www.internationalpaper.com/docs/default-source/english/sustainability/treerings.pdf?sfvrsn=2
- You Can Tell a Tree By its Bark - http://www.internationalpaper.com/docs/default-source/english/sustainability/treebark.pdf?sfvrsn=2
- Leaves and Needles -http://www.internationalpaper.com/docs/default-source/english/sustainability/leavesneedles.pdf?sfvrsn=2

Chapter 7: Program Sessions at Mac's Treehouse

Inspiring Invention Through Stories

Program Session #9:

Title: Walk Like an Egyptian - 2 sessions

Topic: Pyramid building and mummification

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges
- CCSS.ELA-LITERACY.SL.1.4: Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

Next Generation Science Standards:

- LS1.A: Structure and Function. All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.
- ETS1: Engineering Design K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Gabby Fountain

Target age range: 7-12 years old, first-fourth grade

Number of participants: 20-30 participants

Duration: 60 minutes (2 sessions)

Problem-Based Scenario:

Chen visited Ms. Cortez at the library and she had a display of ancient Egypt books. Chen checked some books out because he and Digger love going on adventures. They discovered all about the pyramids and the mummification process. Hearing this information Tanisha was interested in hieroglyphics. The trio decided to bring ancient Egypt to Curiosity Creek. With Tanisha's help cartouches were made for their friends, Chen and Digger created a pyramid and they even mummified an apple!

Brief Overview:

In this activity, children will learn how ancient Egyptians were able to accomplish written communication, architecture, and life skills. Children will learn to use hieroglyphs. Children will design and build a pyramid. Children will also learn how the mummification process works, and will have the opportunity to try it at home. Using background knowledge and newly learned vocabulary words, the children will learn how tasks can be done without modern day technology but instead with the scientific process.

Essential Question: How were ancient Egyptians able to accomplish so much without modern day technology?

Big Ideas/Learning Outcomes:

Session 1:

- Children will learn to use hieroglyphs and create their own cartouche.
- Children will learn about the mummification process.

Session 2:

- Children will design and build their own pyramid.
- Children will reflect on their creations and generate ideas on how ancient Egyptians were able to accomplish so much without modern day technology.

Literary and/or Informational Text(s):

- Non-Fiction & Informational: *You Wouldn't Want to Be a Pyramid Builder!: A Hazardous Job You'd Rather Not Have*, by Jacqueline Morley.
- (optional) Further Non-Fiction & Informational: *Mummies and Pyramids: A Nonfiction Companion to Mummies in the Morning*, by Mary Pope Osborne. *How the Sphinx Got to the Museum*, by Jessie Hartland.
- (optional) Fiction & Literary: *Bill and Pete Go Down the Nile*, by Tomie dePaola. *Mummies in the Morning*, by Mary Pope Osborne.

Vocabulary:

- *Hieroglyph (hi-er-o-glyph)* - a stylized picture of an object representing a word, syllable, or sound, as found in ancient Egyptian and other writing

systems.

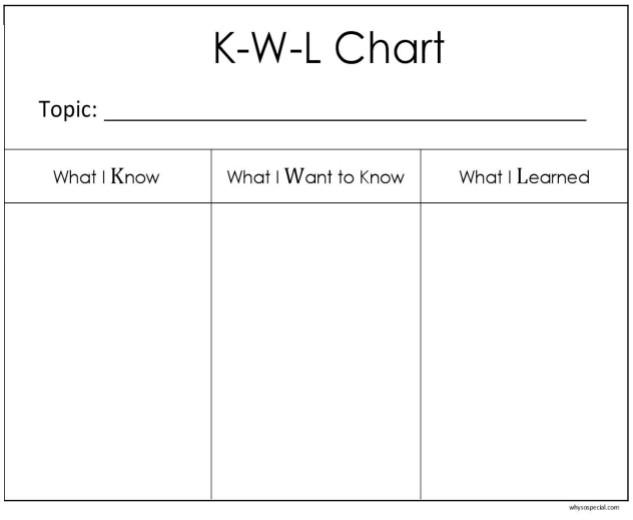
- *Cartouche (car-touche)* - an oval or oblong enclosing a group of Egyptian hieroglyphs, typically representing the name and title on a monarch.
- *Mummification* - the process in which the skin and flesh of a corpse (dead person) can be preserved (kept). The process can occur either naturally, or it can be intentional (on purpose). It if occurs naturally, it is the result of cold (glacier), acid (bog) or dryness.
- *Canopic jar* - a covered urn used in ancient Egyptian burials to hold the entrails from an embalmed body.
- *Natron* - was the preservation solution that the Egyptians used during the embalming process. It preserved the bodies and organs by drying out the moisture also serving as a disinfectant.

Content or Background Information:

- The whole process of mummification took about 70 days.
- The body was covered with natron (salt) and was left for 40 days to allow the salt to dry.
- During this time the internal organs and brain were removed and placed in special containers called canopic jars.
- The jars had hieroglyphic writing and the heads of different Gods on top of the lids. Each jar contained a different organ.
- The body was then stuffed, washed in spiced wine, and perfume was added.
- Then the body was carefully wrapped in linen bandages.
- When all this was done, the body was placed in a series of coffins.

Materials and Preparation:

- Have a KWL chart = What we know about Egypt. What we want to know. What we have learned.
- Pencils, clipboards, glue, scissors, ruler
    - Cartouche name plate outline
    - Black construction paper
    - String
- Sugar cubes (around 400 cubes)
- Cardboard


K-W-L Chart

Topic: _____

What I Know	What I Want to Know	What I Learned

Procedures for Session 1 → Cartouche & Mummification:

1. Welcome the group and, using the illustration from page 93, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.

2. To help the group come up with ideas to help solve the problem-based scenario, read to them at least one of the texts listed on page 95.
3. Either work as a group or give everyone a copy of a KWL chart (see above for example of chart) and have them fill out what they know about mummies. Discuss answers. [CONNECT]
4. Work through the background information and other vocabulary words so all have shared meaning. Use your non-fiction and informational books as resources.
5. Show examples of artifacts and mummification.

Cartouche [CONSTRUCT]

- Have the entire English alphabet printed out in Hieroglyphs (see attachment for list)
- Remember to make sure your letters go up and down.
- Find the letters needed for your name and glue them on your name plate.
- Round all 4 corners with scissors and then glue to black construction paper.
- Glue string as an outline around your name.

Mummification [INVESTIGATE]

- Create canopic jars by covering condiment bottles with paper and draw or print the head pictures and gluing them to the front.
- Hand out sheet on how to mummify apples.
- Note: Video on mummifying an apple -

https://www.stem.org.uk/resources/elibrary/resource/32084/app-primary-science-mummification-deborah-herridge

6. Reflect upon the process as a group.

Assessment:

- Ask the children how hard it was to find the right symbol and arrange them in correct order for cartouche. Is our 26 letter alphabet easier? Remind the children we cut and glued the pictures to spell the words, imagine drawing the pictures out.
- Have an example of a mummified apple and normal apple to let the kids look at how the mummification process works and why canopic jars would be important.

Procedures for Session 2 → Egyptian Pyramid:

1. Start program off with greeting and a fiction/literary book.
2. Review KWL chart of mummies and make a new one about pyramids. [CONNECT]
3. Use your ruler and pencil to draw a 12” x 12” square. Cut out the square and use it as a base for your pyramid. [CONSTRUCT]

4. Make a sugar cube square. Create a 10 by 10 square base of sugar cubes in the center
   of the cardboard square (using 100 sugar cubes total). Glue down each sugar cube using white school glue.
5. Add the second layer to the pyramid. Position a 9 by 9 square of sugar cubes in the center of the first layer (using 81 cubes). Glue down each sugar cube.
6. Continue adding layers. Each layer should be 1 cube smaller than the previous layer, so the next layer is 8 by 8 (64 cubes), 7 by 7 (49 cubes), 6 by 6 (36 cubes), 5 by 5 (25 cubes), 4 by 4 (16 cubes), 3 by 3 (9 cubes) 2 by 2 (4 cubes), and finally a single sugar cube on top.
7. Let the glue completely dry. Allow the glue to dry for several hours to ensure all the sugar cubes are firmly in place. *Next session, you can paint pyramid if desired.
8. Give students time to express how they felt about this process and what they learned. [REFLECT and/or EXPRESS]

Modifications for All Learners:

- The sugar cube pyramids could take longer because of dry time, make sure there is space for pyramids to dry without being disturbed.
- Show pictures of what Egyptian pyramids, mummies, and cartouches look like for visual learners.
- Take time to pronounce the vocabulary together.
- For the Egyptian Pyramid you may also use lego blocks or cups.

Assessment:

- Ask the children how easy designing the pyramid was? Could you design it any other way? Discuss the weather elements and why using the mud brick mixture Egyptians used was best.

Credits:

CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- Provide Hieroglyph printable charts as take homes so kids can practice making cartouches.
- Encourage families to make canopic jar heads either out of clay or salt dough.
- Take home science experiment on how to mummify an apple.
    - Cut through the top of an apple to slice it in half, and then in half again.
    - Put the apple slice in a plastic cup.
    - Have each child thoroughly mix 1 cup of baking soda and 1 cup of salt.
    - Pour the baking soda/salt mixture over the apple in the cup so that the apple is completely covered.
    - Store the covered apples away from light and moisture for one week. Note: You might store one apple slice, uncovered, alongside the students' buried apples. Students will be able to compare what happens

to their "mummified" apples to what happens to an apple that isn't treated with the salt mixture.
A week later, have students uncover their apple slices. What do they see? *(The mummified apple will be shriveled up and its skin will have turned brown.)*

Attachments: (Session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

- Hieroglyph Printable Charts - https://www.egyptabout.com/2016/12/hieroglyphics-chart.html
- Lessons in Egyptian Hieroglyphs - http://www.greatscott.com/
- Cartouche Template - https://jimmiescollage.com/downloads/history/Egyptian-Cartouche-Template-Notebooking-Pages.pdf

Inspiring Invention Through Stories
Program Session #10:
Cloudy with a Chance of Fun!

Title: Cloudy with a chance of FUN!

Topic: Science - Weather

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.1: Ask and answer such questions as *who, what, where, when, why*, and *how* to demonstrate understanding of key details in a text.
- CCSS.ELA-LITERACY.RL.2.2: Recount stories, including fables and folktales from diverse cultures, and determine their central message, lesson, or moral.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Gabby Fountain

Target age range: 5-8 years old, kindergarten to second grade

Number of participants: Ideal group size would be 10-15 children.

Duration: 60 minutes

Problem-Based Scenario:

The Curious Kids are sitting by Mac's treehouse daydreaming and describing what "The Perfect Spring Day" would look like. Mimi challenges them to come up with a new design for a cloud that no one has ever thought of before. If books can take you anywhere, dream big like the sky!

Brief Overview:

In this activity, participants will learn about weather and cloud formations. Children will identify different types of clouds and their descriptive properties. After reading texts explaining the different cloud types, children will help decipher what type of precipitation can form from each cloud. Through creation and play, participants will be able to build clouds through sensory activities and soap cloud experimentation. After

playing and experimenting, children will be asked to brainstorm and create new types of clouds that no one has ever seen before. What makes it so different? Using the background knowledge and definitions of the vocabulary words, the children will have a better understanding of the different types of clouds to help create and design their own cloud sky.

Essential Question/Problem: If you could design the clouds, what type of clouds would you create and why?

Big Ideas:

- Participants will apply vocabulary from read-aloud texts to design and create their own examples.
- Participants will realize that different nature elements create different types of clouds.
- What would new clouds look like? What makes them so special?

Literary and/or Informational Text(s):

- Non-Fiction & Informational: *The Cloud Book*, by Tomie de Paola
- (optional) Fiction & Literary: *Cloud Dance*, by Thomas Locker, *Little Cloud*, by Eric Carle, *It Looked Like Spilt Milk*, by Charles G. Shaw, *Love is in the Air*, by Jonathan Fenske
- (optional) Further non-fiction & Informational: *What Do You See in a Cloud?*, by Allan Fowler, *What Makes the Sky Blue?*, by Janet Slingerland, *Clouds*, by Marion Dane Bauer, *Clouds*, by Anne Rockwell.
    - *Where in the World Can I…Touch a Cloud?* by Shawn Brennan (World Book publishing. Book not found on Amazon)

Vocabulary:

- Cirrus clouds are characterized by thin, wispy strands.
- Cumulus clouds are characterized as having flat bases with “puffy”, “cotton-like” or “fluffy” appearances.
- Stratus are low-level clouds characterized by horizontal layering with a uniform base.
    - Cirrostratus are high, thin sheer-like thin clouds that usually cover the entire sky.
    - Cirrocumulus are small rounded puffs that usually appear in long rows high in the sky. Usually white but sometimes appear gray.
    - Cumulonimbus are a type of cumulus clouds associated with thunderstorms and heavy precipitation.
    - Altostratus are mid-level, gray or blue-gray clouds that usually covers the whole sky. If you seen altostratus clouds, a storm with continuous rain or snow might be on its way.
    - Altocumulus are small mid-level layers of patches of cloud which most commonly exist in the shape of rounded clumps.

- Stratocumulus clouds are characterized by large dark, rounded masses, usually in groups, lines or waves.
- Nimbostratus are low, gray, often dark nearly uniform cloud that usually produce continuous rain, snow or sleet and no lightning or thunder.

Content or Background Information:

- This activity is based on the idea of play and imagination.
- Participants will define different types of clouds
- Throughout history and in different cultures the interpretations of clouds have many meanings.
- Participants will define different types of cloud formations and create examples of them.
- Participants will use descriptive words to help identify different formations. The more descriptive you can be, the better you will be at creating detailed examples.
- Participants will use the engineering design process to imagine and create a new type of cloud that does something special and unique.

Materials and Preparation:

- Soap Clouds
  - Ivory soap
  - Wax or parchment paper
  - Microwave
- Sensory Play Clouds
  - Whipped cream (creamy) = edible
  - Shaving cream (creamy) = NON-edible
  - Marshmallow cream (sticky) = edible
  - Marshmallows (fluffy) = edible
  - Coconut oil (oily) = edible
  - White sprinkles (hard) = edible
  - Cotton balls (soft) = NON-edible
  - Muffin tin & baking sheets

Procedures:

1. Welcome the group and, using the illustration on page 100, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. Read *The Cloud Book* by Tomie de Paola to get students thinking about various types of clouds.

3. Have visuals of the different types of cloud formations – discuss either in small groups as a whole what formation is what or use descriptive words – feathery, fluffy, puffy, etc. Focus on the discussion and identifying process. [WONDER]

Design Sensory Play Clouds

4. Place desire materials out for participants. Have participants design their clouds on cookie sheets using sensory materials above. Note that shaving cream is a great tool to use at the end as it cleans and makes everything smell nice. [CONSTRUCT]

Soap Clouds

5. Place a piece of waxed or parchment paper in your microwave.
6. Place the soap on waxed or parchment paper.
7. Start your microwave for a couple of minutes on high power. Watch and see!
8. Allow time for participants to discuss their creations and experience. [REFLECT and/or EXPRESS]

Modifications for All Learners:

- Having the name of the clouds and visual picture will help participants retain the names of the different cloud formations.
- There are three examples that can be taught with more descriptive details.
- Having different supplies for the sensory clouds if anyone has allergies or to use what is available.

Assessment:

- Participants understanding can be observed by saying the name of a cloud and seeing if they can make that shape of cloud. Have the cloud names either printed and cut out for easy gluing or provide all the materials have participants design a cloud portrait.

Credits:

CuriosityCreek.com
https://ourbestbites.com/kitchen-craft-soap-clouds-and-homemade-kiddie-tub-soaps//

Family Literacy Element (ideas for at home follow-up):

- Librarians could have toilet paper tubes & string on hand for children to create binoculars to observe clouds after the program.
- Trace shapes onto manila folders and then cut the shapes out. These folders would be used for a cloud shape scavenger hunt.

Attachments: (Session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

Inspiring Invention Through Stories
Program Session #11:
Cranes that Lift, Not Fly

Title: Cranes That Lift Not Fly

Topic: Engineering

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.1: Ask and answer such questions as *who, what, where, when, why*, and *how* to demonstrate understanding of key details in a text.
- CCSS.ELA-LITERACY.RL.2.2: Recount stories, including fables and folktales from diverse cultures, and determine their central message, lesson, or moral.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Gabby Fountain

Target age range: 5-8 years old, kindergarten to second grade

Number of participants: Ideally this would be for 10-12 individuals, younger children may need partners. More participants may require multiple facilitators.

Duration: 45-60 minutes

Problem-Based Scenario:

It's construction season at Curiosity Creek. Digger and Chen are out for a walk and observe all the big machinery and the super-strong cranes. How can a crane so tall be so strong and stable? The Curious Kids are on the task to see if they can create their own strong and stable crane so they can make additions onto Mac's treehouse. How can we build a cane that doesn't tip over? Can you show them how to build one?

Brief Overview:

In this activity, participants will learn about cranes and how they are used for lifting and moving heavy objects. Children will learn that it is important to have strong and stable cranes. Preventing them from tipping over while carrying heavy loads is a

challenge. Children will also learn detailed information about cranes, such as the fact that they actually hoist to lift objects but cannot move them sideways. Children will then create/build and improve in repetition to get a strong, stable crane. Using background knowledge and newly learned vocabulary words, the children will learn about trusses and counterweights.

Essential Question: Can you build a super-strong crane that doesn't tip over?

Big Ideas:

- Participants will collaborate with their partners to generate, share, and listen to ideas, and work cooperatively towards a solution.
- Participants will apply their ideas to build and test a novel creation.
- Participants will reflect on their creations and generate ideas for future improvement.

Literary and/or Informational Text(s):

- Fiction & Literary: *Little Excavator*, by Anna Dewdney; *What Can a Crane Pick Up?*, by Rebecca Kai Cotlich; *The Diggers are Coming*, by Susan Steggall; *Tip Tip Dig Dig*, by Emma Garcia
- Non-Fiction & Informational: *Cranes*, by Amanda Doering Tourville; *Cranes*, by Charles Lennie; *Diggers and Cranes*, by Alvin Granowsky

Vocabulary:

- Hoist: an act of raising or lifting something
- Truss: a structure that consists of two-force members only, where the members are organized so that the assemblage as a whole behaves as a single object→ evenly distributes weight to handle changing tension and compression
- Winch: a mechanical device that is used to pull in (wind up) or let out (wind out) or otherwise adjust the tension of a rope or cable.
- Stabilize: to make stable, steadfast, or firm
- Tension: the state of being stretched tight
- Outriggers: legs on a wheeled vehicle which are folded out when it needs stabilization
- Counterweight: a weight that by exerting an opposite force, provides balance and stability of a mechanical system.

Content or Background Information:

- Knowledge and meaning of the vocabulary terms.
    - The triangle is a strong and useful shape in engineering. Triangles are strong shapes because they don't bend or collapse when they hold up weight. Rectangles can easily collapse info flattened parallelograms if you put too much weight on them. When engineers use triangles to make a structure strong, it's called a truss.
    - A winch for winding the string is needed. A winch is a mechanical device that is used to wind up and wind out. In its simplest form, it consists of a

spool attached to a hand crank.
    - Outriggers are added beams that help stabilize structures.
    - After more building and improving, children will use counterweights. Counterweights help with balance by using one weight against another. If your crane is tipping forward, add counterweights to the back!

Materials and Preparation:

- ¼" dowel 36" long
- Masking tape
- 10" x 12" piece of corrugated cardboard aka the cardboard used in packing
- Plastic straws
- Paper clips
- Scissors
- Sharpened pencil
- String
- Small paper cup
- Pipe cleaner
- Metal washers (or other small weights)
- 6" jumbo craft sticks

Procedures:

1. Welcome the group and introduce the problem-based scenario using the illustration found on page 105, providing any necessary background on Curiosity Creek and the Curious Kids. Start by reading the suggested texts to help participants form new knowledge and access prior knowledge. [CONNECT]
2. Pass out necessary materials and ask students some of the leading questions in the problem-based scenario. [WONDER]
3. Begin the construction process. Apply a piece of tape onto the end of the dowel - make sure that half of the tape is wrapped around while the other half is hanging free (half-on/half-off taping technique). [CONSTRUCT]
4. Wrap the tape under the short side of the cardboard.
5. Make the crane stronger! Keep using the half-on/half-off taping technique to attach a straw to the cardboard. Tape the other end to the dowel.
6. Position another straw directly across from the first and attach it to the cardboard and the dowel. This will give the dowel solid support.
7. Add trusses to your crane's structure to help to make it strong and stable.

8. Prepare to add the string. First unbend a paperclip and tape it to the top of the dowel.
9. Make a winch for winding the string. (A winch is a mechanical device that is used to wind up and wind out. In its simplest form, it consists of a spool attached to a hand crank.) Cut two scraps of cardboard that are about 1 ½" x 4". Bend them in half. Use a sharpened pencil to poke a hole in each one.

10. Tape the two pieces onto the cardboard base so that the holes are facing each other. Thread the pencil through the holes in each.
11. Use the half-on/half-off taping technique to attach a piece of string that's about twice as long as your dowel to the pencil. Turn the pencil to wrap the tape around it! Thread the opposite end of the string through the hook at the top of the dowel.
12. The crane structure is done!
13. Reflect upon the process as a group. [REFLECT and/or EXPRESS]

Modifications for All Learners:

- Improve the Crane
    - You will need to attach something on the free end of the string for holding onto whatever you are lifting. A simple hook made from a paper slip, a basket, a magnet, a net, be creative!
    - Creating a bucket with a small cup and a pipe cleaner that holds metal washers is a great way to test load. Start with something light and add more weight after each successful test.
    - Hang the test weigh off the hook at the end of the string. The weight may make your crane tip over. If this happens, find ways to make your crane more stable.
    - Add beams that help stabilize structures (outriggers). Overlap at least half of your large craft sticks with the underside of the cardboard base and tape it in at least two places.
    - Lengthen the outriggers by attaching another craft stick to make your

crane even more stable! Continue to overlap the sticks and tape in two or more places to make sure it doesn't bend.
    - Another way engineers stabilize cranes is by adding a counterweight. Counterweights help with balance by using one weight against another. If your crane is tipping forward, add counterweights to the back!
- After each successful test, add a little more weight until your crane tips over again.

- Adaptations for younger audiences (kindergarten-first grade):
    - The length of the dowel and the size of the cardboard affect how challenging this project will be. Longer dowels and smaller pieces of cardboard are more difficult to stabilize. Shorter dowels with larger cardboard are easier.
    - For younger audiences, working with partners may help when holding two objects in the right position and taping them together. You may also show them how to apply the tape to the object individually so that half of each length of tape is hanging free. Then arrange and hold the two objects in the right position and secure the free ends of the tape.

Assessment:

- Participants' creations can be observed easily in this activity by seeing if the crane is stable and able to lift weights. Have buckets pre-made to test weight limit with a variety of things to lift.
- Participants' movements can be observed as assessment; is their crane able to lift more weight and do participants modify their cranes with outriggers? Did combining outriggers and counterweights make the crane super stable? How could they build a crank onto their winch? How could they redesign the crane hook so it can pick up other things, like a small stuffed animal?

Credits:

CuriosityCreek.com
The Zoom Fly Bolt Blast STEAM Handbook by Lane Akiyama

Family Literacy Element (ideas for at home follow-up):

- Set out books with the theme of construction vehicles and have children create a crane made out of Legos.

Attachments: Crane construction machine coloring for children to take home - librarian responsible for the creation of take-home activities (optional)
http://coloring-4kids.com/hoisting-crane-coloring-page-for-kids/

Chapter 8: Program Sessions in the Curiosity Creek Library

Inspiring Invention Through Stories

Program Session #12:
Birdfeeder Builders

Title: Birdfeeder Builders

Topic: Biology & Engineering

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges
- CCSS.ELA-LITERACY.SL.1.4: Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Nate Keefe

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: Ideal group size is 6-12 children and their caregivers. More than this may require multiple facilitators and dividing into smaller groups.

Duration: 60 minutes

Problem-Based Scenario:

It is springtime in Curiosity Creek, and the birds have returned to begin building nests and raising new families. But last night was much colder than expected, and there are no insects to be found for our hungry feathered friends. Ms. Cortez has a lot of birdseed, but no feeder. Also, Muff and Scruff report that they heard the squirrels near the library are pretty greedy when it comes to birdseed and aren't great at sharing. If a feeder is hung off the ground, Ms. Cortez thinks that the squirrels will leave it alone and the birds will have enough to eat until it warms back up. There are lots of trees around the library. How can the Curious Kids make a birdfeeder to help out the birds without the squirrels taking all the birdseed? Tanisha brought all sorts of supplies from her art studio that the Kids can work with. They need your help to design and build one!

Brief Overview:

In this activity, participants will design and build a bird feeder that can be hung off the ground using a variety of materials. After reading a literary text about a man who battles squirrels at his birdfeeders, the group will explore an informational text (optional) featuring various ways to make bird feeders out of ordinary recycled items at home. Using these texts as inspiration, participants will work individually to create and build their own bird feeders to help the Curious Kids arrive at a solution to their problem. The session will wrap up with a show-and-tell discussion, in which participants will describe and reflect on their process.

Essential Question/Problem: How can limited resources be used to build a birdfeeder to meet certain requirements?

Big Ideas:

- Participants will respond to a problem by reviewing requirements and designing/building a solution.
- Participants will select materials for their creation to suit the needs of their design.
- Participants will reflect on their creations and generate ideas for future improvement.

Literary and/or Informational Text(s):

- Literary: *Those Darn Squirrels!*, by Adam Rubin
- (optional) Non-Fiction & Informational: *Birdfeeders (Kids Can Do It)*, by Renee Schwarz

Vocabulary:

- *Problem* - a matter or situation regarded as unwelcome or harmful and needing to be dealt with and overcome.
- *Solution* - a means of solving a problem or dealing with a difficult situation.
- *Requirements* - a thing that is needed; a necessary condition.
- *Iteration* - To continue to alter a design to make it even better.

Content or Background Information:

- This activity is a great way to teach children the basics of the engineering design process. We are presenting the problem and requirements, participants need to generate a solution, and they will iterate as they go. When their product is complete, they will reflect on it. Testing will happen at home.
- Engineers need to be thinking about who their users are when they design a product. Who are the users for the birdfeeders? The birds, of course! How might different birds use the feeder? How will they access the seed? What will keep it from spilling? Where will they perch? Will the feeder be weatherproof? These will set the requirements for the invention.
- Background knowledge of Curiosity Creek and the Curious Kids will help, but is not entirely essential.

Materials and Preparation:

- Copies of the texts listed above.
- Librarian will stage (on a table) other age-appropriate texts from the library collection focused on birds, bird feeding, building/crafts, and maybe even squirrels! These will inspire brainstorming and creativity, as well as be available for check out after the session.
- Birdseed--enough for each participant to fill their bird feeder and test it out. A simple scoop or funnel may be needed to distribute this to participants. Alternately, the librarian can pre-apportion this into a sealable sandwich bag for each participant to save time during the session.
- A wide variety of materials for construction. The more diversity in materials you have, the better! Suggestions include:
    - Empty plastic bottles and yogurt containers
    - Paper cups
    - Pie tins
    - Cardboard
    - Paper plates
    - Toilet paper tubes
    - Duct tape
    - String
    - Pipe cleaners
    - Chopsticks, small dowels, or skewers
    - Craft sticks
- Tools for construction, including:
    - Scissors
    - Hole punch
    - Nails for poking holes in things (adults will supervise/assist)
    - Crayons or markers for decorating feeders
    - Glue and glue sticks
    - Hot glue gun if desired (adult will operate)
- You may be tempted to create a sample birdfeeder to use for demonstration purposes, but this should be avoided--it may influence and inhibit participant design. If you do make one of these to experience the process, save it until the end of the activity to share.
- Handout for parents with at-home ideas (simple and self-created with library links/QR codes/information to register for upcoming programs)

Procedures:

1. Welcome the group and, using the illustration found on page 110, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. Let's read a story about a man who struggled with squirrels as he fed birds. Read *Those Darn Squirrels* aloud to the group. How did the squirrels conspire to get the birdseed? What happened in the end? The squirrels in this story are pretty sophisticated, but thanks to Ms. Cortez, we know that the squirrels near the Curiosity Creek library will leave the bird feeders alone as long as they are off the ground. [CONNECT]
3. Remind participants that engineers in the real world are challenged to create **solutions** to solve **problems**. They need to meet **requirements**, or needs, with what they create. Engineers are never really done--they keep working to make solutions better--this is called **iteration**. [WONDER]
    - What is today's **problem**? (need to help hungry birds)
    - What will the **solution** be? (some type of bird feeder--design and style is up to you!)
    - What are the **requirements**? (must hold birdseed, must hang off the ground to protect seed from squirrels)
4. Share all of the materials with the participants, so they see what is available to them as they begin to think about their birdfeeders. We can also use books to help us get ideas--if it is available, share Renee Schwarz's *Bird Feeders* book to help get the creative juices flowing. Also use other texts available in your library to provide further examples Will all of our feeders look and work the same? (No) [INVESTIGATE]
    - Point out/share any other books pulled for inspiration
5. Now it's time to build! Give the group ample time to create their designs and experiment with the materials. Some participants may find that they start a type of design, only to find that it doesn't assemble the way they expect it to, and need to start over. This is fine and is all part of the process. Iteration! [CONSTRUCT]
    - Parents and library facilitators may be needed to assist children with poking holes in bottles with nails, operating the hot glue gun, and other tasks to ensure safety.
6. As participants finish up their designs, the librarian will circulate to distribute birdseed. Participants should fill their bird feeders to test how well they hold seed!
7. When everyone's birdfeeder is complete (or nearly complete), reconvene the group and have participants share their birdfeeder designs. Discuss and reflect on the process. Questions might include:
    - How will the feeder be suspended off the ground? (**requirement**)
    - Does it hold seed? (**requirement**)
    - How did you come up with your design?
    - Did you make any changes along the way?

(**iteration**)
    - If you were to start again from scratch, what would you do differently?
    - Did your **solution** help fix the **problem**?

  This reflection is an important part of the innovation process, and encourages participants to think critically about their decisions. [REFLECT and/or EXPRESS]
8. Participants will take home their birdfeeders and test them out. Encourage parents to check in and send pictures to the library's social media to let us know how it worked, and what birds may have visited the feeder. Bird identification books are available for checkout!
9. Take pictures of each creation for the library--you may need these to promote your library's programming or as a basis for a future activity!

Modifications for All Learners:

- If space at the library permits, hang the bird feeders in the yard for participants to test and observe. This would be best suited to happen over a period of days. It will help if there already is a birdfeeder being used in the yard, as sometimes it takes several days to attract birds to a new feeding space.
- This activity could be modified for older audiences by making it a competition--for example, whose feeder attracts the most birds, whose holds the most seed, whose lasts the longest in harsh weather, etc.
- For younger audiences, it may be helpful to offer fewer materials, and have parents play more of a coaching role and assist with construction.

Assessment:

- Observation of design/iteration that goes into each birdfeeder will provide insight on the creative process.
- Completed birdfeeders will serve as an example of creativity and innovation.
- Participants' reflection on the process will reveal grasp of innovative thinking.

Credits:

CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- Librarians may produce a very simple handout with the following prompt:
    - *Now that you've made your birdfeeder, it's time to test it out! Find a place to hang it near your home, watch it over several days, and work as a family to keep a simple log of who visits your feeders. You can use a field guide borrowed from the library, web tools from the Cornell Lab of Ornithology (https://www.allaboutbirds.org/guide/), or download the free Merlin Bird ID app to identify birds you see. Did your birdfeeder keep away squirrels, or did they eat the seed? Keep the library updated on social media!*

    - *You may also want to submit pictures you have taken to submissions@curiositycreek.com to be featured on the CuriosityCreek website!*
- Librarians should include the date and registration information/link/QR code for future programs

Attachments: (Session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

Inspiring Invention Through Stories
Program Session #13:
Ear Engineers

Title: Ear Engineers

Topic: Biology & Engineering

Literacy Standards:

- CCSS.ELA-LITERACY.RI.2.7: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.
- CCSS.ELA-LITERACY.SL.2.4: Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- LS1.A: Structure and Function - All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive/grow.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Nate Keefe

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: Ideal group size is 6-12 children and their caregivers. More than this may require multiple facilitators and dividing into smaller groups.

Duration: 60 minutes

Problem-Based Scenario:

Ms. Cortez, the librarian at the Curiosity Creek Public Library, has asked the Curious Kids to take a survey of local bird species so she can share it with all community members. According to Mimi, a great way to gather information about what birds live nearby is by learning their calls. After some practice sessions with Mimi, they are ready to identify all the different birds at Curiosity Creek by ear! But they soon learn while hiking around that the human sense of hearing is no match for capturing all the sounds from the environment. If they could invent a device that would improve their hearing, the Curious Kids are confident that they'll hear all the different types of birds that live there. Tanisha, Hector, and Ms. Cortez have gathered some materials and supplies to work with, but they need your help to invent a hands-free way to better hear the bird calls they are listening for!

Brief Overview:

In this activity, participants will design, construct, and test a contraption that will increase their ability to hear noises from their environment. After listening to a read-aloud of an informational text focused on how different animals' adaptations help them hear better, and discussing ways humans can improve their directional hearing, participants will choose from a variety of materials to build a wearable contraption that will help the Curious Kids solve their problem. The session will conclude with participants testing their creations, sharing them with the group, and reflecting on the process.

Essential Question/Problem: How can you design a device to improve your hearing?

Big Ideas:

- Participants will use knowledge gained from an informational text to inspire a creation to solve a problem.
- Participants will apply basic elements of biomimicry to inform their inventions.
- Participants will select materials and construct an invention to address specific needs.
- Participants will test their inventions, reflect on the innovation process, and generate ideas for future improvement.

Literary and/or Informational Text(s):

- Non-Fiction & Informational: *What If You Had Animal Ears?*, by Sandra Markle
- Literary: *The Listening Walk*, by Paul Showers (optional)

Vocabulary:

- *Biomimicry* - the design and production of materials, structures, and systems that are modeled on biological entities and processes.
- *Amplify* - increase the volume of (sound), especially using an amplifier.

- *Vocalization* - speech, communication using the human voice.
- *Survey* - a list of the different types of animals (species) that live in a certain area
- *Species* - a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.

Content or Background Information:

- The scenario for this activity is based on the real scientific practice of wildlife surveying. Biologists conduct surveys of wildlife populations in a given area to gather data about trends and inform policy decisions about wildlife. Naturalists and the public are eager to learn what animals live nearby, and many people base a lifelong hobby of keeping a list of animals they have seen. This includes birders.
- Birding by ear is a popular way to identify species, and there are many tools to learn bird calls including free apps such as Audubon Bird Guide and Merlin Bird ID.
- Biomimicry involves using nature as an inspiration for invention. It also emphasizes finding sustainable solutions to problems. We will focus on the former of these for this activity.
- The basic concept of collecting and amplifying sound through "funneling" sound from a certain direction is the same for all, but participants may create unique and innovative ways of doing this.
- Background knowledge of Curiosity Creek and the Curious Kids will help, but is not entirely essential.

Materials and Preparation:

- Copies of the texts listed above
- Librarian will stage (on a table) other age-appropriate texts from the library collection focused on senses, ears (humans and animals), birds, animal noises, and sound. These will inspire brainstorming and creativity, as well as be available for check out after the session.
- Access to bird songs/calls. Ideally, this would be a space outside the library, but it may also be an online noise making app, such as Noisli.
- Wide variety of materials for construction. At least some of these should be cup-shaped. Also, there should be some materials suitable for attaching these devices to participants' heads, such as elastic or plastic headbands for crafting. The more diversity in materials you have, the better! Suggestions include:
    - Paper cups of various sizes
    - Paper plates
    - Paper bowls
    - Construction paper
    - Cardboard
    - Toilet paper tubes
    - Duct tape
    - String

    - Pipe cleaners
    - Craft sticks
    - Aluminum foil
    - Elastic band
    - Plastic headbands for crafting
- Tools for construction, including:
    - Scissors
    - Hole punch
    - Stapler
    - Crayons or markers
    - Glue and glue sticks
    - Hot glue gun if desired (adult will operate)
- You may be tempted to create a sample device to use for demonstration purposes, but this should be avoided--it may influence and inhibit participant design. If you do make one of these to experience the process, save it until the end of the activity to share.
- Handout for parents with at-home ideas (simple and self-created with library links/QR codes/information to register for upcoming programs)

Procedures:

1. Welcome the group and, using the illustration from page 118, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. Inventors can use nature as an inspiration for things they create. This is called **biomimicry**. For example, Velcro was inspired by an engineer who discovered seed burrs stuck to his dog and his own pants after spending time in the woods. Share this short video on biomimicry with the participants: https://thekidshouldseethis.com/post/31460154153. [WONDER]
3. We can also get ideas from books we read. Read *What If You Had Animal Ears?* aloud to the group, and discuss some of the ways animals' ears are adapted for excellent hearing. What are some ideas we can borrow from animals (**biomimicry**) to help the Curious Kids solve their problem? For example, the jackrabbit's ears serve as "sound scoops" to **amplify** (or make louder) the sound from all around them. We can try doing this the same way by cupping or hands behind our ears and catching the sound from the direction we are facing. [INVESTIGATE]
4. The Curious Kids will be doing a **survey** of all the bird **species** in an area by listening to their **vocalizations** (songs and calls they make). Biologists do this, too; a **survey** is a list of the different types of animals (**species**) that live in a certain area. This information helps wildlife by letting us know who lives where, and who might need help. Plus, it's fun!
5. The Curious Kids need a device they can wear hands-free to improve their hearing, and we have all of these materials to work with. Give it a try!
6. Give the group ample time to experiment with the materials and construct

their creations. They may refer back to *What If You Had Animal Ears?* or the texts that were pulled/staged for inspiration and ideas. [CONSTRUCT]

- Parents and library facilitators may be needed to assist children with some of the construction tasks such as operating the hot glue gun, but should be sure to let the children lead (even if their ideas may seem like they won't work!).

7. When everyone's contraption is complete (or nearly complete), reconvene the group. Now it's time to test our inventions! Take a short walk outside (if available), or use a sound-making app such as Noisli to play some bird and nature sounds.
8. Have participants test their inventions by first listening without them, and then placing them on their heads and testing them out. Do the inventions seem to work? Is anyone willing to share their invention with another group member to try out?
9. Discuss and reflect on the process. Questions might include:
   - What idea did you settle on for your invention? Why?
   - How did the inventing process work? Did it go as planned? If not, what happened? Compare this to the process adult inventors go through.
   - If you were to start again from the beginning, what would you do differently? Were there any materials you think would work really well that we didn't have this time?

   This reflection is an important part of the innovation process, and encourages participants to think critically about their decisions. [REFLECT and/or EXPRESS]
10. Take pictures of each invention for the library--you may need these to promote your library's programming or as a basis for a future activity!

Modifications for All Learners:

- If time permits and the text is available, the librarian may wish to read *The Listening Walk* to prepare the group for tuning in to nature sounds(optional).
- It might be fun for the librarian to teach a common local bird call (such as American robin) to the group. The Audubon Bird Guide app shared above maybe useful for this. Then, the group could use their inventions to listen for, identify, and count these outside the library.
- Extensions for other programming may be a series of programs in which participants create their own inventions based on biomimicry. The informational book featured in this lesson belongs to a series, including *What If You Had Animal Eyes?*, *What If You Had An Animal Nose?*, and *What If You Had Animal Feet?*
- For younger audiences, it may be helpful to offer fewer materials (for example, all of the participants may create a headband-based invention), or eliminate the "hands-free" requirement to simplify the process. Additionally, parents may play more of a coaching role and assist more with construction.

Assessment:

- Observation of design/iteration that goes into participant inventions will demonstrate understanding of biomimicry as well as provide insight on the creative process.
- Completed inventions will serve as an example of creativity and innovation, and will provide participants with the opportunity to immediately test effectiveness.
- Participants' reflection on the process will reveal grasp of innovative thinking.

Credits:

CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- Librarians may produce a very simple handout with the following prompt:
  - *How well does your invention work? It's time to do more testing! Finda spot in nature (could be a nearby park or your yard), and have different members of the family test out the invention for 1 minute each. While they listen, they will write sounds they hear with the invention. Once everyone is done, compare sounds heard with the invention to sounds heard without. Does it work?*
  - *Make adjustments to the invention with things you have around the house and re-test!*
  - *To try your invention indoors, you may use nature sounds from an online noise-generation app, such as Noisli (https://www.noisli.com/).*
  - *Share how your invention worked on the library's social media!*
- Librarians should include the date and registration information/link/QR code for future programs

Attachments: (Session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

Inspiring Invention Through Stories
Program Session #14:
Curious Kids Create Catapults

Title: Curious Kids Create Catapults

Topic: Engineering

Literacy Standards:

- CCSS.ELA-LITERACY.RL.1.5: Explain major differences between books that tell stories and books that give information, drawing on a wide reading of a range of text types.
- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Stephanie Prato

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: 10-12 participants - May accept more depending on available materials and staff.

Duration: 30 minutes

Problem-Based Scenario:

Muff and Scruff live in the Marshlands and love to pull pranks. As a funny joke, they take all of the rocks and stones around Curiosity Creek and pile them up in front of the library! Now the Curious Kids can't get in to read and borrow books! There are many rocks and some of them are too heavy to carry or throw by hand. Can you help the Curious Kids design a catapult to safely shoot the rocks back into Curiosity Creek?

Brief Overview:

In this activity, participants will design and build their own catapults and test them by launching marshmallows. In the literary text, participants will read about a

mouse who thinks like a scientist and creates a catapult to help answer a question. In the informational text (optional), students can explore different types of catapults. Then, considering the problem-based scenario with the Curious Kids, participants will work independently or in pairs to design and build their catapults.

Essential Question: What materials and design should we use to create a functional catapult?

Big Ideas:

- Every object on earth has potential energy. That means it could move even if it isn't right now. When an object is moving it has kinetic energy.
- Catapults are machines that turn potential energy into kinetic energy.
- A catapult is a ballistic device used to launch a projectile a great distance without the aid of explosive devices.

Literary and/or Informational Text(s):

- Literary: *Scampers Thinks Like a Scientist*, by Mike Allegra
- Non-Fiction & Informational: *Break the Siege: Make Your Own Catapults (Tabletop Wars)*, by Rob Ives (optional)
- Also consider sharing books containing catapults from medieval times to encourage further exploration.

Vocabulary:

- *Potential energy* - the energy held by an object because of its position relative to other objects. A stationary object that could move soon.
- *Kinetic energy* - the energy of an object in motion
- *Projectile* - A projectile is any object thrown into space by the exertion of a force.

Content or Background Information:

- This activity is a design/engineering challenge in action, and there are multiple ways to solve this problem.
- It's helpful to set expectations and ground rules before constructing the catapults. For example, only marshmallows can be used as projectiles. Participants can only fire projectiles from their catapult in one direction, towards the target or bullseye.
- Participants should be encouraged to discuss ideas before beginning construction. This will help them experience the "Imagine" and "Choose & Plan" steps of the design process.
- Expect students to create a prototype, test it, and then iterate on it, if need be. Background knowledge of Curiosity Creek and the Curious Kids will help, but is not entirely essential.

Materials and Preparation:

- Copies of the texts listed above
- 10 craft sticks/popsicle sticks (per participant)
- 4 rubber bands (per participant)
- 1 Bottle cap (per participant)
- Glue (hot glue works fastest)
- 2-3 bags of mini marshmallows
- Handout for parents with at-home ideas (simple and self-created with library links/QR codes/information to register for upcoming programs)

Procedures: (you can see pictures of each step here)

1. Welcome the group and introduce the problem-based scenario using the illustration on page 127, providing any necessary background on Curiosity Creek and the Curious Kids.
2. Read the suggested texts to the group and brainstorm how catapults can be created and why they could be useful. [WONDER]
3. Begin the construction process. Attach two pieces for the base: Once the paint is dry, rubber-band two sticks together at one end, then set aside. [CONSTRUCT]
4. Make the cross piece/wing: Stack the remaining eight sticks and rubber band them together at both ends.
5. Connect: Slide the stack of eight sticks in between the two sticks that you already banded together.
6. Make an X at the center: Use the fourth rubber band to secure all of the craft sticks together.
7. The educator or librarian should use a hot glue gun to secure a bottle cap to the end of the catapult.
8. Test out catapult using a printed bullseye. This will help students reflect on the process and explore various designs created by all participants. [REFLECT and/or EXPRESS]
9. If time allows, provide additional craft sticks and rubber bands so participants can try iterating on their designs.

Modifications for All Learners:

- Instead of marshmallows, you could also try using packing peanuts, cotton balls or pompoms as projectiles
- Instead of using a target or a bullseye, split the class into teams and divide your space in half. Give them 30 seconds to launch as many marshmallows as they can across the divided line and count how many are on each side at the end of the timed period, to determine the winners.
- For younger students consider a more open-ended version of this session plan where kids can create simple catapults out of plastic spoons, salad tongs, clothespins, tape, rubber bands, etc. See this blog post for inspiration.

Assessment:

- Were students able to successfully construct a catapult?

- Did they find unique ways to add to or modify their design?
- How do participants reflect on their work and share it with the group?

Credits:

- CuriosityCreek.com
- The Indianapolis Public Library has some great ideas about building catapults, plus a longer booklist
- DIY Network instructions for how to make a toy catapult

Family Literacy Element (ideas for at home follow-up):

- Librarians may produce a very simple handout with the following prompt:
    - *Now that you've solved a problem for the Curious Kids with popsicle sticks and rubber bands, how else can you create a catapult? With a parent's permission, look around for other materials that could turn potential energy into kinetic energy and try them out with adult permission and supervision!*
    - *You may also want to submit your picture to submissions@curiositycreek.com to be featured on the CuriosityCreek website!*
- Librarians should include the date and registration information for future programs

Attachments: (Session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

Chapter 9: Program Sessions in the Art Gallery

Inspiring Invention Through Stories

Program Session #15:
Duct Tape Technicians

Title: Duct Tape Technicians

Topic: Engineering - design and fabrication

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Test, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Nate Keefe

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: Ideal group size is 6-12 children and their caregivers. More than this may require multiple facilitators and dividing into smaller groups.

Duration: 60 minutes

Problem-Based Scenario:

The Curious Kids are exploring, and came upon a beautiful mound of rocks that would be perfect to have Mac investigate back in his treehouse. There's only one problem - they have no bag to put these in, and none of them have pockets! Plus, they are all using walking sticks, so they can't just carry them in their hands. Hector did bring along a roll of duct tape, and the kids have some popsicle sticks from treats they were all eating. Can you help the Curious Kids invent a way to carry 10 of these rock specimens back to Mac's treehouse using just these materials?

Brief Overview:

In this activity, participants will devise an innovative way to transport rock specimens using only duct tape and craft sticks. After reading a literary text about a girl that loves collecting rocks, the group will explore an informational text (optional) that shows a few items that can be made with duct tape to generate ideas and inspiration. Then, participants will work in pairs to design, create, and test their own solutions to the

problem. A reflection discussion at the end of the process will give participants the chance to share their creations and reflect on the process.

Essential Question/Problem: How can you use your knowledge and imagination to make a working container out of limited resources?

Big Ideas:

- Participants will collaborate with their partners to generate, share, and listen to ideas, and work cooperatively towards a solution.
- Participants will apply their ideas to build and test a novel creation.
- Participants will reflect on their creations and generate ideas for future improvement.

Literary and/or Informational Text(s):

- Literary: *Rhoda's Rock Hunt*, by Molly Beth Griffin
- Non-Fiction & Informational: *How to Make Stuff With Duct Tape*, by Samantha Bell (optional)

Vocabulary:

- *Collaboration* - the action of working with someone to produce or create something.
- *Iteration* - Retooling the design and making it work better
- *Structural Integrity* - is the ability of an item—either a **structural** component or a **structure** consisting of many components—to hold together under a load, including its own weight, without breaking or deforming excessively.

Content or Background Information:

- This activity is a design/engineering challenge in action, and there are multiple ways to solve this problem. Some groups may create a basket or bag, while others may use the sticky properties of the duct tape to hold the rocks.
- Participants should be encouraged to discuss ideas before beginning construction. This will help them experience the "Imagine" and "Choose & Plan" steps of the design process. Parents and library facilitators may need to assist pairs of participants to ensure that everyone's ideas are heard.
- Each member of the pair should be involved in each step, including construction.
- Though duct tape is designed to be torn by hand, parents should help children do this as needed. Scissors will also be available.
- Expect pairs to create a prototype, test it, and retool it if/when it fails to meet their needs. This is engineering in action!
- Background knowledge of Curiosity Creek and the Curious Kids will help, but is not entirely essential.

Materials and Preparation:

- Copies of the texts listed above
- Librarian will stage on a table other age-appropriate texts from the library collection focused on rocks, minerals, and fossils, as well as duct tape crafting. These will inspire brainstorming and creativity, as well as be available for check out after the session.
- Several rolls of duct tape - at least 1 big roll per pair of attendees
- Large box of craft sticks - at least 20-25 sticks per pair of attendees
- Small rocks - these may be rocks gathered from near your library, or purchased. River rocks no larger than 2 inches in diameter are recommended. 10 rocks per pair of attendees are needed.
- Several pairs of scissors (to cut duct tape as needed)
- Handout for parents with at-home ideas (simple and self-created with library links/QR codes/information to register for upcoming programs)

Procedures:

1. Welcome the group and introduce the problem-based scenario with the illustration found on page 130, providing any necessary background on Curiosity Creek and the Curious Kids.
2. Let's read a story about another kid who liked to collect rocks but ran into a challenge. Read *Rhoda's Rock Hunt* aloud to the group. Unlike the CuriousKids, Rhoda is equipped with a backpack, but she still has too many rocks to transport. What does she decide to do? [WONDER]
3. Your challenge will be to collaborate, design, and build a solution to solve the Curious Kids' problem. "Collaborate" means work together to make something. How can you be a good collaborator?
4. Share the two materials each pair will have to work with to solve this problem: duct tape and craft sticks. Show the participants, parents, and volunteers how to tear duct tape (across). Parents and volunteers will need to help participants out with this, as children will lack the hand strength to tear the tape. We will also provide scissors to help this go more smoothly. [CONNECT]
5. We can use books to get ideas for inventing things and see what others have done that will help us. If available, share the book *How to Make Stuff With Duct Tape* by Samantha Bell with the group. There are 5 craft projects in here (but none of them are baskets or bags!) - these will be examples of what others have done to make things out of duct tape (without giving participants a product to copy). If this book is not an option, you may choose to show pictures (available online) of multiple projects made completely out of duct tape! [INVESTIGATE]
6. Divide the group into pairs. Have each group select 10 rocks from a central pile and bring to their tables/work areas.

7. Point out staged texts on table for participants to explore and research about rocks/minerals as well as duct tape creations as they generate ideas to solve the problem.
8. Provide time for pairs to brainstorm solutions, and choose a plan to move forward with. You may introduce this with something like "Before they start building, engineers share ideas and discuss them so they can agree on the best solution. You have 5 minutes to plan, and then we'll start construction and testing!" Providing a time limit may help ensure that the group follows this step and stays focused. [CONSTRUCT]
9. Now it's time to build! Invite pairs to get a roll of duct tape and as many craft sticks as they need. Tell pairs they can build, test, and change their designs as they go. Retooling the design and making it work better is called "iteration." Parents and library facilitators will be on hand to assist as needed, and ensure that both members of each pair have the chance to be involved.
10. When everyone has had the chance to build and test at least one solution, as well as iterate a bit, reconvene the group for circle time and have participants share their solutions. Invite pairs to demonstrate their solution in action. Discussion questions may include:
    - How did you decide on a plan?
    - Did your plan work the first time? Did you test your plan after you built it? Did this drive any changes to your plan, and what were they?
    - What would you do differently if you could do this again?

    This reflection is an important part of the innovation process, and encourages participants to think critically about their decisions. [REFLECT and/or EXPRESS]
    - Probably one of the issues that arose with most groups is that their creations were not able to hold the weight of the rocks at first. This idea is called "structural integrity," and working engineers use it all the time. How? (bridges, buildings, etc.)
11. Take pictures of each creation for the library - you may need these to promote your library's programming or as a basis for a future activity!

Modifications for All Learners:

- For a natural twist to get participants outdoors, change the problem-based scenario to have participants gather their own rocks outside the library (or other natural materials such as seeds, leaves, etc.), and design/build a way to transport these items to Mac's treehouse with the duct tape and craft sticks.
- Several adaptations may be made for a younger audience, including more parental support with possibly larger groups (3-4 per group). It may also be advisable to lessen the number of rocks to be transported, as well as have parents assist with construction as needed.

Assessment:

- Observations of collaboration, idea sharing, and even distribution of tasks can be done to get a sense of these skills.
- Observation of design/iteration that goes into each pair's product will showcase creativity and innovation.
- Participants' reflection on the process will reveal grasp of innovative thinking.

Credits:

CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- Librarians may produce a very simple handout with the following prompt:
    - *Now that you've solved a problem for the Curious Kids with duct tape and craft sticks, what else can you make out of duct tape? Come up with a problem to solve or a need you have, and build a solution! Be sure to ask an adult first before using duct tape. Have an adult take a picture of what you made, and share it to the library's social media!*
    - *You may also want to submit your picture to submissions@curiositycreek.com to be featured on the CuriosityCreek website!*
- Librarians should include the date and registration information/link/QR code for future programs

Attachments: (Session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional).

Inspiring Invention Through Stories

Program Session #16:

Bucket of Junk

Title: Bucket of Junk

Topic: Engineering & Design, Natural Disasters

Literacy Standards: Identify problems, analyze solutions to a problem, synthesize information, compare and contrast solutions to a problem, revise/edit solutions for improvement.

- CCSS.ELA-LITERACY.RL.K.9: With prompting and support, compare and contrast the adventures and experiences of characters in familiar stories.
- CCSS.ELA-LITERACY.RL.1.2: Retell stories, including key details, and demonstrate understanding of their central message or lesson.
- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges

Next Generation Science Standards:

- 2-ESS1-1 - Earth's Systems: Processes that Shape the Earth - Use information from several sources to provide evidence that Earth events can occur quickly or slowly. [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.]

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Katie McGinnis

Target age range: Second - fourth grade; ages 8-10 years old

Number of participants: 15 to 25 (may be more or less depending on available materials and staff)

Duration: 60 minutes (can be adapted for more or less time)

Problem-Based Scenario:

It's a rainy day in Curiosity Creek and the kids are looking forward to Tanisha's art opening tonight. They decide that she may need help setting up so they decide to join her. However, on their way the ground suddenly starts shaking! What could it be they wonder? Hector's wheels start turning. They run to a nearby picnic table to take cover beneath it. Frantic, they start debating what it could possibly be. When it passes, they rush to see Tanisha at the **art gallery**.

"What happened!?" exclaims Timmy as he enters the door.

The **art gallery** was destroyed; every painting had fallen and every sculpture had broken. Tanisha was safe, but very upset. Some of her artwork was going to be shown tonight at a reception and now it was all ruined.

"My show is in one hour!" cries Tanisha. "How am I ever going to show my artwork if it is completely destroyed!"

Overhearing the stressful cries, Itty Bitty Kitty suddenly pops into the Gallery, "Is everyone alright? Let's all calm down and relax a minute with a song."
They take a deep breath, but are interrupted by Digger tearing up the pile of junk and picking up items he finds enjoyable. This gives Hector an idea.

"What if we remade your art?" Hector explains. "We could make new art out of all this stuff!"

"This junk, you mean?" asks a confused Tanisha. "It's not junk, it's art." says Hector.
"He's right." says Itty Bitty Kitty, "Music isn't music until you put all the pieces together! We can make art out of what's already here!"

The Curious Kids need your help! Can you help them make artwork for Tanisha's show out of junk and find out what happened to make Curiosity Creek shake?

Brief Overview:
Students will create an art piece out of various recycled materials. Students will be given a "bucket of junk" and use the materials within to make something of their choosing. The creation does not necessarily have to have a purpose, but should be a creation of their imagination.

Essential Question: How can we use recycled materials to create/invent something new?

Big Ideas:

- Participants will relate to the story *Have Fun Molly Lou Melon* by Patty Lovell because Molly is creating her own fun using items she already owns. Using her imagination she is able to create new things out of pre-existing items. This will help students understand the concept of recycled art.
- Participants will identify problems and solutions in the read-aloud/Curious Kids scenario, as well as discuss why using your imagination can help you have fun and/or be successful.
- Participants will analyze the situation the Curious Kids found themselves in and identify why the ground was shaking in Curiosity Creek.
- Participants will identify solutions to the curious kids problem and discuss what it means to create something new out of old/pre-existing items.
- Participants will create/design a recycled art piece/invention using items from their bucket of junk.
- Participants will reflect on their design/creation/invention during discussion and give/receive feedback for improvement.

Literary and/or Informational Text(s):

- Literary: *Have Fun, Molly Lou Melon*, by Patty Lovell
- (optional) Non-Fiction & Informational: Copies of books on Earthquakes

Vocabulary:

- Art gallery: a room or building for the display or sale of works of art.
- Art show: the displaying of one's artwork
- Recycled art: art created from found or disposed of materials (recyclables, 'trash', etc.)
- Design: a plan or drawing produced to show the look and function or workings of something.
- Earthquake: a sudden and violent shaking of the ground, sometimes causing great destruction, as a result of movements within the earth's crust or volcanic action.

Content or Background Information: Students may or may not be familiar with the characters of Curiosity Creek. You may want to brief them on the characters before beginning the session. Students may also need more support in designing their art piece. What can art look like? Does it have to look like anything? How can we use what we have to create something new?

Materials and Preparation:

- Copies of the texts listed above – You may choose to have multiple copies of the text for participants to look through on their own when designing their art piece/invention. This will help them explore further and get a more hands on experience.

- A variety of construction supplies to build their art piece. Others may choose to sketch their art piece, imagining what kind of materials may have been found in the mess of the art gallery. However, some may want to take a more hands on approach. Include the following items if possible (but not limited to):
    - Recyclables (bottles, cans, plastic, containers, etc...)
    - Glue and tape, glue gun/sticks if desired
    - Scissors
    - Crayons/paint/colored pencils
    - Toilet paper tubes/other cardboard materials
    - Construction paper
    - Blocks/scrap wood pieces
    - Pom-poms/cotton balls/styrofoam
    - Toothpicks/popsicle sticks
    - Pipe-cleaners
    - Googly eyes/decorative materials
    - Paint
    - Handout for parents with at-home ideas (simple and self-created with library links/information to register for upcoming programs)

Procedures:

1. Welcome the participants and start the session by explaining that the Curious Kids need their help saving Tanisha's **art show**! Introduce the problem based scenario and the illustration found on page 136. If participants have never before heard of Curiosity Creek, some of the characters may need to be introduced. This will engage the participants and help them relate to the characters when completing the mission.
2. After hearing their situation, participants will imagine what it would be like to work so hard at something and then have it destroyed. How would you feel if you were Tanisha? [CONNECT]
3. Before reading the literary book, make some predictions about what might have happened in Curiosity Creek. If an earthquake comes up, describe what an earthquake is by exploring various informational texts on earthquakes. You may choose to pass these texts out and have the students work in groups to find out more about earthquakes and what they are like. What causes them? To take this one step further, you may choose to have participants come up with a list of protocols/safety tips for what to do if an earthquake occurs. How do you stay safe? This could act as an extension activity for participants to do at home with their families. [INVESTIGATE]
4. After discussion, read the students the book *Have Fun, Molly Lou Melon,* by Patty Lovell. Have a conversation at its conclusion.
    a) What happened in the book?
    b) How did Molly Lou Melon use her imagination in the book?

c) What was different from what she and her friend did? Which would you prefer and why? [WONDER]
d) Can you think of any ideas from this book that may help the Curious Kids?

5. Students will then brainstorm possible solutions to this problem. They should ask themselves what kind of art piece/invention they want to make. You may choose to have students work in groups, or make their own personalized creation. Give each student (or group of students) a bucket of junk (this should include a basket full of recyclables and other materials they can use to create something new). Explain to students that they can use anything they want in the bucket in any way, but they have to use it all. In order for Tanisha to make her art show a success, she has to both make new art and clean up the gallery, and this will help her do that.
6. Participants will then plan their creation by sketching out their plan including the items they have in their bucket. They may choose to add words to describe specific parts of their art piece. Participants can then name/title their art piece based on it's design or purpose. The instructor may also choose to give an example or share his or her own at the end, as not to interfere with participants designs. Parents may be able to assist in this portion of the session (helping with supply management, not necessarily building the prototype, as that should be solely student created). This portion of the session will take the most time! [CONSTRUCT]
7. When everyone has completed their designs/pieces gather as a whole group and have participants share their creations. What did you create and why? Reflect on the choices participants made and how they believe they could save Tanisha's art show. Participants may choose to tell/write the ending of the story and how their art piece was a success at the gallery opening. This story telling session will not only help students reflect on their own process, but also help them compare their choices with others. [REFLECT and/or EXPRESS]
8. End this session with participants pairing up and discuss what they could have done differently to improve their design/art piece.
9. Be sure to record session experiences, including but not limited to: student quotes, pictures, invention designs, etc.… and share them on the library's website to promote future sessions.
10. **Optional:** Hold an art show at the library featuring your participant's pieces! You can also include the ending to their story about the Curious Kids, or read to parents the scenario and challenge them to think about what they would create if given a bucket of junk!

Modifications for All Learners:

- You may choose to print out visuals of the Curiosity Creek characters to help participants visualize the problem/mission, including the character descriptions of each character.
- If limited time is available, have participants sketch what they would create out of a given list of recycled materials.
- This session was designed for participants to choose whether they wanted to create a 2D design and/or 3D design. However, you may choose for students and limit materials based on whether you want them to create only a sketch. This may be easier for younger participants who may struggle with construction.
- You may need to give younger students more instruction/guidance when beginning the design process. You could provide examples of what a similar design may look like, or even show a prototype of a made-up device. Be sure to show a couple options so students do not just copy one.

Assessment:

- Participants' designs/art pieces may be observed to assess understanding (creativity, development, chosen design, etc.)
- Participants' reflection on the process, including story development (finishing the story and explaining how they completed the task) and understanding of earthquakes. This will help evaluate participants based on the design process, as well as their problem-solving techniques.

Credits:

CuriosityCreek.com
New York State Fair Bucket of Junk Competition

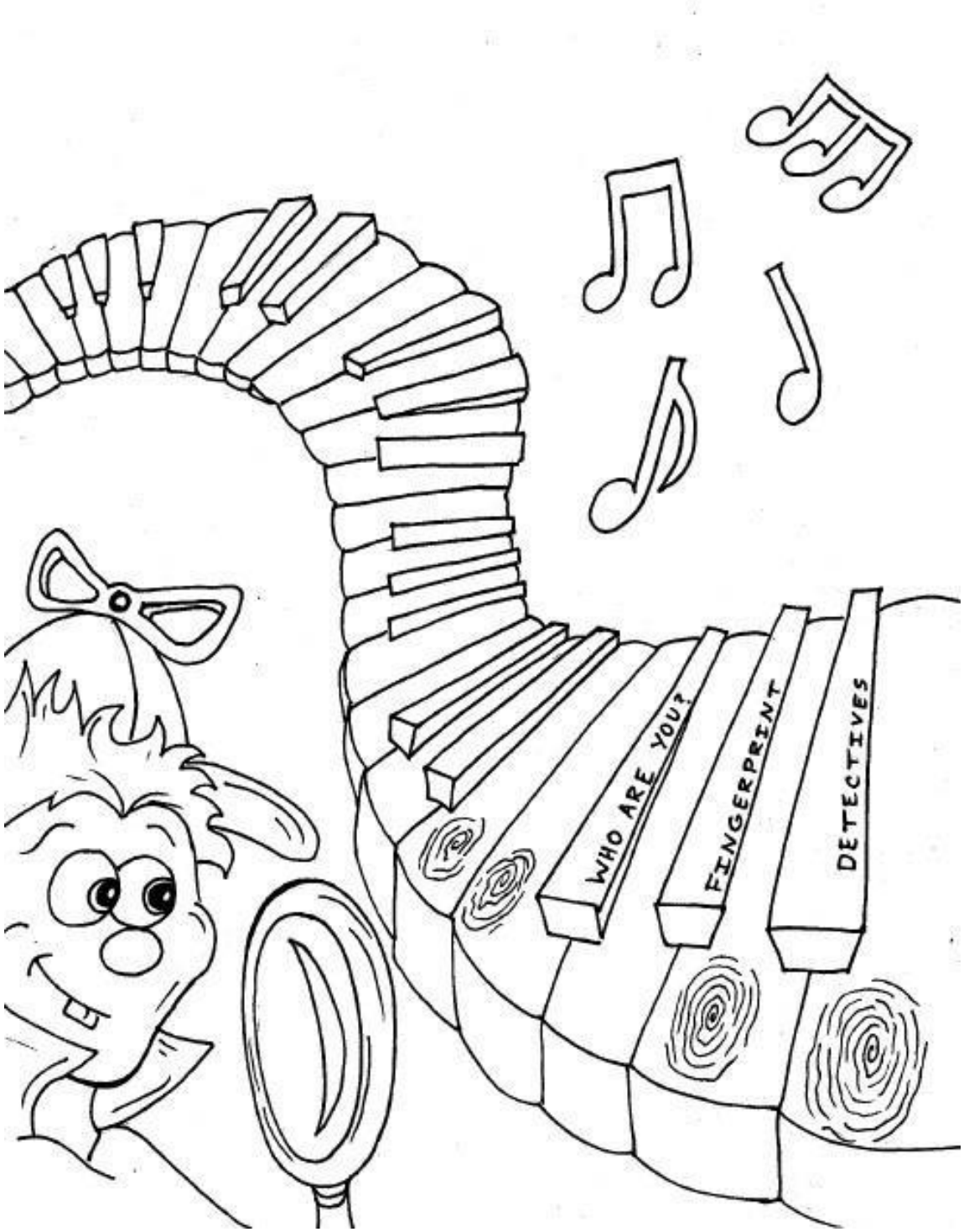
Family Literacy Element (ideas for at home follow-up):

- *Extended Learning:*
    - To take this activity one step further, you may choose to have students come up with a list of protocols/safety tips for what to do if an earthquake occurs. How do you stay safe? This could act as an extension activity for students to do at home with their families.
    - Talk more about recycled art and how it impacts our environment. Why is it important to reuse items that we would normally throw away?
    - Hold an art show at the library featuring your participants pieces! You can also include the ending to their story about the Curious Kids, or read the scenario to parents and challenge them to think about what they would create if given a bucket of junk!
- *Submit your art piece sketch/photo to submissions@curiositycreek.com to be featured on the Curiosity Creek website!*
- Include registration information for future sessions

Attachments: Curiosity Kid character guide, session-related handouts, activity sheets and/or take-home materials for parents - librarian responsible for the creation of take-home activities (optional)

Chapter 10: Program Sessions at Itty Bitty Kitty's Place

Inspiring Invention Through Stories
Program Session #17:
Who Are You? Fingerprinting



Title: Who Are You? Fingerprints

Topic: Fingerprinting Science Activity

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.7: Use information gained from the illustrations and words in a print or digital text to demonstrate an understanding of its characters, setting, or plot.
- CCSS.ELA-LITERACY.SL.1.4: Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Gabby Fountain

Target age range: 6-10 years old; kindergarten to fourth grade

Number of participants: 10-15 participants

Duration: 60 minutes

Problem-Based Scenario:

Muff and Scruff love pulling off pranks in Curiosity Creek. They decided to take Itty Bitty Kitty's piano music to tease her! Itty Bitty Kitty enlisted the help of Mac, Hector, and Timmy to help find the missing music. The detective team of Mac, Hector, & Timmy went to the crime scene (her piano) and saw evidence of fingerprints on the piano keys. Using the scientific process of fingerprinting, the detective team lifted fingerprints off the keys and compared them to the rest of the Curious Kids. Are they able to narrow down the suspects? Which fingerprints match the guilty party? (You may choose to make this challenge harder and not reveal the culprits until the end of the session!)

Brief Overview:

In this activity, children will learn how to look at fingerprints in multiple ways. Children will experience the scientific process of step by step deduction. Children will be able to decipher how to read fingerprints. They will also learn where fingerprints can be found. Using background knowledge and newly learned vocabulary words, participants will be able to create a story based on a person's fingerprint.

Essential Question: How can we look at fingerprints and what can a fingerprint tell us?

Big Ideas:

- Learning "detective/scientific" questions - How, Why, Who?
- Everyone has a unique set of fingerprints.
- All fingerprints are made up of loops, whorls, or arches.

Literary and/or Informational Text(s):

- Non-Fiction & Informational: *Forensics in the Real World*, by L. E. Carmichael
- (optional) Further Non-Fiction & Informational: *Fingerprinting*, by Boy Scouts of America. *Fingerprinting, Bite Marks, Ear Prints: Human Signposts*, by Angela Libal.
- (optional) Books by Bobbie Nuytten
    - *Fingerprint Animals*
    - *Fingerprint Bugs*
    - *Fingerprint Vehicles*
- (optional) Fiction & Literary: *Forever Fingerprints: An Amazing Discovery for Adopted Children*, by Sherrie Eldridge.

Vocabulary:

- *Fingerprints*: the impressions left by skin ridges on human fingers.
- *Dermatoglyphics*: the scientific study of fingerprints. Derma means skin and glyphics means carving.
- *Loop*: fingerprint pattern involving ridges that enter and exit from the same side

- *Whorl:* fingerprint pattern involving circular ridges
- *Arch:* fingerprint pattern where ridges enter from one side and exit on the other side

Content or Background Information:

- No two people have identical fingerprints, but fingerprint patterns tend to run in families.
- Fingerprint patterns consist often of whorls, loops, or arches, and fingers often leave imprints of sweat and oil behind.
- There are different numbers of lines in each fingerprint - sometimes the lines are really close together and sometimes they are farther apart.
- Crime investigators use fingerprinting to help solve crimes.
- Fingerprints are also used for other identification purposes.

Materials and Preparation:

- Magnifying glasses or magnifying sheets
- Clipboards
- White Paper & pencils
- Ink pads
- Crayola Model Magic Clay
- Baby powder or powdered sugar
- Clear packaging tape
- Black construction paper
- Clear glass or jar
- Paintbrush or makeup brush
- Cocoa powder

Procedures

1. Welcome the group and, using the illustration from page 143, introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids.
2. To help the group brainstorm ideas to help solve the problem-based scenario, read to them at least one of the texts listed on page 145.
3. Get a close-up look at their fingertips by using magnifying glasses or magnifying sheets. [WONDER]

TO GET PRINTS

4. Use Crayola Model Magic Clay and have each child press one of their fingers, their choice, into the clay to create a fingerprint.
5. Once a fingerprint is made, use a magnifying glass to look at the ridges or whorls.
6. Have children trace their hands on white paper, using a pencil.
7. On a different piece of paper, scribble hard with pencil until a small area is covered with graphite. Ask your kids to rub their left pinkie around in the graphite until it is covered with the gray substance.

8. Carefully, help your kids place their left pinky finger on the sticky side of a piece of clear tape, then gently lift their finger off the tape. A clear fingerprint should be visible.
9. Have them place the tape face-down on a piece of paper.
10. Have your kids repeat this with each finger of their left hand until they have fingerprints of each of their five fingers traced and taped to the paper. Now do it with their right hands. Most older kids will get the hang of it quickly and be able to do it themselves. [INVESTIGATE]
11. Let kids inspect their fingerprint under a magnifying glass. Ask them whether the prints are the same on each hand and whether they see any patterns like loops or arches.
12. Try another version of fingerprinting by using baby powder. You will get a more detailed view this way. Place a piece of clear packaging tape over the powdered finger and you will have an instant fingerprint!
13. Hold the tape up to the light and you will see all the lines and ridges plus a very clear view of the fingerprint pattern.
14. Tape the prints to black construction paper so you can view again later.

TO LIFT PRINTS

15. Ask children to rub their hands together and to make several clear fingerprints on a transparent glass.
16. Using a brush, have children very gently dust some cocoa powder onto one of the fingerprints on the glass. [CONSTRUCT]
17. Ask them to blow the excess cocoa powder away and let them lift the fingerprint with a piece of tape. It may take some practice.
18. Tape the fingerprint onto a piece of white paper and ask them to try to match it to one of the fingerprints from the first part of the experiment. Can they figure out which finger it came from?
19. Allow time for children to create a story about their fingerprints. Is there a scar? How did that happen and why? Give them ample time to share with others.
20. As a group talk about their discoveries! What happened and why? Our skin produces natural oils, which leave behind a residue when our fingers touch or press against a surface or object. The powder sticks to these oils, making visible the unique patterns made by the ridges on our fingertips. No two people have the same fingerprint patterns. How do you think this is useful for detectives in solving mysteries? [REFLECT and/or EXPRESS]

Modifications for All Learners:

- Have a police officer come in and explain why fingerprinting is important in their line of work. They may also be able to help the children throughout the process of making/lifting their own prints.
- Note: Playdough does not work as well as the modeling clay because it isn't as firm. You could also use oven bake clay if you want a more permanent result.
- Instead of using ink pads (and having little ones with ink on their fingers), use

Crayola Model Magic Clay to create fingerprints.

Assessment: Have examples of library staff fingerprints for reference. Leave fingerprints on a water glass and have children try to identify which librarian used the glass.

Questions to Ask:

- Are your prints the same on each hand? Do you see any patterns like loops or arches?
- What are different fingerprint patterns?
- Does everyone really have a unique fingerprint?
- Do biological siblings have similar fingerprints?

Credits:

- CuriosityCreek.com
- https://www.nsta.org/sciencematters/docs/Shippensburg-FingerPrinting2.pdf
- http://www.onin.com/fp/fphistory.html
- https://science.howstuffworks.com/fingerprinting.htm

Family Literacy Element (ideas for at home follow-up):

- After learning how to fingerprint and looking at the different patterns, create fingerprint cartoon art. Use the ink pads and make fingerprint stamp flowers or shapes, etc... or add a face and cartoon body with pens.

Attachments: Provide extra paper and 'how to' instructions to take fingerprints at home - librarian responsible for the creation of take-home activities (optional)

Inspiring Invention Through Stories
Program Session #18:
Storytelling with Scratch

Title: Storytelling with Scratch

Topic: Storytelling & Computer Programming

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.5: Describe the overall structure of a story, including describing how the beginning introduces the story and the ending concludes the action.
- CCSS.ELA-LITERACY.RL.2.7: Use information gained from the illustrations and words in a print or digital text to demonstrate an understanding of its characters, setting, or plot.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Stephanie Prato

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: 10 recommended - May accept more depending on available materials and staff.

Duration: 60 minutes

Problem-Based Scenario:

Timmy is shy, but he is very creative. He has great ideas and great stories to tell, but he needs to find ways to be able to share his ideas. He and the Curious Kids loved programming and coding their robot, and Timmy wonders if there is a way for him to use computer programming to share his ideas with more people! Can you help Timmy write a story using Scratch?

Brief Overview:

In this activity, participants will practice storytelling and the engineering design process by creating a story using Scratch, a free web-based visual programing language. This activity helps children learn some fundamentals of computer programming, while

they practice their storytelling skills in a creative and open ended format. At the end of the program, participants will have the chance to share their stories with the class and reflect on the process. Note: This session would be great after "Curious Kids Code".

Essential Question: What is the best and most efficient way to code/tell the story using Scratch?

Big Ideas:

- Stories have a setting, characters, and a narrative with a beginning, a middle, and an end.
- Students will learn some basic functions in Scratch and use the program to make their stories come to life. They will be exercising their computational thinking skills and using the Engineering Design Process and the Stripling Model of Inquiry to make their stories come to life.

Literary and/or Informational Text(s):

- Literary: *How to Code a Sandcastle*, by Josh Funk
- Non-Fiction & Informational: *What is Computer Coding?*, by Mary K. Pratt (optional)

Vocabulary:

- *Setting* - the place or type of surroundings where something is positioned or where an event takes place
- *Characters* - the people (or animals) in a novel, play, or movie
- *Dialogue* - a conversation between two or more people
- *Programming* - creating steps or instructions for the computer to follow; the action or process of writing computer programs

Content or Background Information:

- Scratch is a free, web-based visual programming language developed by the MIT Media Lab to help kids learn computer programming.
- Preview the Scratch "Create a Story" tutorial to learn more about Scratch and to prepare to facilitate the program. You can follow the tutorial exactly during your program, or use it more as a jumping off point for creativity, as I've suggested below
- The Educator Guide will also be helpful to review.
- Every program that you write must start with an "Event" as the first command.

Materials and Preparation:

- One computer per student
- Internet access
- Storyboard template & pencils (optional)

Procedures:

Warm-up Activity: Storyboard (10 minutes, optional): Start by welcoming the participants and introducing the Curiosity Kids and the problem-based scenario with the illustration on page 149 before reading *How to Code a Sandcastle* by Josh Funk to get participants excited about coding! Before you jump into programming with scratch, do this activity with participants to help them brainstorm. [WONDER]

1. Ask participants to think of the parts of a story. Their stories will need a character, setting, and some action.
2. Who will be the main character? Where will the story take place?
3. Have your participants use a storyboard template like this one to start to plan out their narrative.
4. Advise them to keep it simple at first, as it may take longer to program than to draw.

Creating a Story Using Scratch:

5. Tell the participants they are going to use their brainstorming and turn it into a story that will play out on their computer screens. Remind them of the problem-based scenario with the Curious Kids and that Timmy needs their help! [INVESTIGATE]
6. Direct participants to the Scratch workspace: drag and drop blocks of code which are on the left, the blank space in the middle is their workspace for the program they are creating, and on the right they will see the screen where their code commands (and eventually their stories) will play out.
7. First, participants will need to select a backdrop, or the setting. [CONSTRUCT]
8. Add a character (called a sprite in Scratch).
9. Make your character say something (using the purple "Looks" commands). Note, you must click on your sprite/character and have it selected in order to add "Say" commands.
10. Add a second character & create a dialogue
11. Switch to a new setting or create some action (make the characters move)
12. Consider adding objects/props (also called sprites)
13. Let the participants explore and help them as needed.
14. With 10 minutes left, invite children to share their coded stories with the group. [REFLECT and/or EXPRESS]

Modifications for All Learners:

- Kids can also work in pairs if you don't have many computers
- For younger participants (if you have more kindergartners in your group) consider putting them in pairs and have them work together on a story

Assessment:

- Have each child or pair show/tell your their story. Did they create a story with at least one character and setting?
- Does the story have action and a beginning, middle and end, or does it seem more like a random sequence of events?
- Was the child or pair able to make their story come to life on the screen using drag and drop code, or is the story they tell you much more detailed than what they were able to program?
- How do participants reflect on their work and share it with the group?

Credits:

- CuriosityCreek.com
- Scratch, MIT Media Lab

Family Literacy Element (ideas for at home follow-up):

- A few minutes before the end of the program, invite parents into the room and allow the children time to share their stories/code with their parents
- Librarians may produce a very simple handout with the following prompt:
    - *Did you know that Scratch is a free, web-based program that you can access at home with an internet connection? Visit scratch.mit.edu to create projects at home.*
    - *You may also want to submit your code to submissions@curiositycreek.com to be featured on the CuriosityCreek website!*
- Librarians should include the date and registration information for future programs

Attachments: (session-related handouts/activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

Any storyboard template; Scratch Story Educator Guide

Inspiring Invention Through Stories

Program Session #19:

Six Apples Up on Top

Title: Six Apples Up on Top

Topic: Engineering Design

Literacy Standards:

- CCSS.ELA-LITERACY.RL.K.1: With prompting and support, ask and answer questions about key details in a text.

Next Generation Science Standards:

- K-2 - ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share, Explain

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Leslie Pcolinsky

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: Ideal group size is 6-12 children and their caregivers. Seek assistance from librarians and support staff as needed.

Duration: 40 - 60 minutes

Problem-Based Scenario:

The season is autumn in Curiosity Creek, and the Curious Kids are excited to go to the Orchard and pick apples. They have a very successful trip and come back with a bushel of apples. There is only one problem, they have no place to store the apples. The Curious Kids want to make sure that all of the hard work of apple picking doesn't go to waste. After spending some time with Ms. Cortez, they decide together that the best way to store the apples would be to stack them "up on top" of each other. How can you help the Curious Kids create a tower of apples that saves space and doesn't let the apples go to waste? Using the supplies provided, work independently or with a partner to design and build a suitable structure to stack six apples on top of each other.

Brief Overview:

In this activity, participants will design and build a structure to support six apples stacked up on top of each other. If available, begin by reading *Ten Apples Up On Top* by

Theo LeSieg, a story about three friends trying to successfully stack 10 apples on top of their heads without them falling over. Following this, read *The World is Not a Rectangle: A Portrait of Zaha Hadid* by Jeanette Winter, which explores architecture through the eyes of a visionary. Participants will now have an idea of what an architect does and can now explore how to use those ideas and practice innovation and engineering design to create their own structure to support six apples, based on the Curious Kids' design challenge. After participants complete the challenge, participants can share out their thoughts, ideas, and processes or use FlipGrid to record a short video about their design thinking and process.

Essential Question/Problem: Based on the materials provided, can you design and build a structure to support six apples stacked on top of one another?

Big Ideas:

- Participants will respond to a problem by reviewing requirements and designing/building a solution.
- Participants will use materials provided to design and build a structure to solve a problem.
- Participants will experience trial and error and revision to solve a problem.
- Participants will reflect on their creations, generate ideas for future improvement, and provide feedback to other designers/engineers.

Literary and/or Informational Text(s):

- Non-Fiction & Informational: *The World Is Not a Rectangle: A Portrait of Architect Zaha Hadid*, by Jeanette Winter
- Literary: *Ten Apples Up On Top!*, by Theo LeSieg (optional)

Vocabulary:

- *Design* - a plan or drawing produced to show the look and function or workings of something.
- *Solution* - a means of solving a problem or dealing with a difficult situation.
- *Revise* - reconsider and amend (something), especially in the light of further evidence or to reflect a changed situation.
- *Reflect* - think deeply or carefully about.
- *Iterate* - perform or utter repeatedly. To work on an ongoing task in order to make better.

Content or Background Information:

- This activity is a great way to teach children the basics of the engineering design process. They are presented with a problem and constraints, and participants will need to generate a solution and design that will effectively hold the apples on top of each other. Upon completion of their design, they will evaluate and

reflect on their successes and failures. How did your thinking change as your design progressed?
- Engineers design products for consumers and businesses. How can we design solutions that are effective for our users? What happens when our design fails? How can we improve on our design to make it successful?
- Background knowledge of Curiosity Creek and the Curious Kids will help, but is not entirely essential.

Materials and Preparation:
- Copies of the texts listed above
- Librarian will have available other age-appropriate texts from the library collection focused on architects, architecture, design and building processes, even other books about apples. These will inspire brainstorming and creativity, as well as be available for check out after the session.
- Apples
- Keva planks or Lincoln logs, or tongue depressors. Any materials that are affordable and allow for manipulation and building.
- Please encourage participants to use their own experience and ideas during the design process. Refrain from helping them create a structure that works effectively.
- Handout for parents with at-home ideas (simple and self-created with library links/QR codes/information to register for upcoming programs)

Procedures:
1. Welcome the group and introduce the problem-based scenario using the illustration on page 155, providing any necessary background on Curiosity Creek and the Curious Kids.
2. Let's read a story (optional) about some friends who tried to stack some apples up and balance them on their heads. Read *Ten Apples Up on Top* aloud to the group. How did they manage to stack those apples and balance them on their heads? [CONNECT]
3. Remind participants that engineers in the real world are challenged to create **solutions** to solve **problems**. They need to meet **requirements**, or needs, with what they create. Engineers are never really done--they keep working to make solutions better--this is called **iteration**. [WONDER]
    - What is today's **problem**? (to create a vertical structure to stack apples)
    - What will the **solution** be? (some type of structure to hold apples up--design and style is up to you!)
    - What are the **requirements**? (must hold apples)
4. Share the materials with the participants, so they see what is available. Start thinking about the design process and share the book, *The World is Not a Rectangle: A Portrait of Zaha Hadid* by Jeanette Winter to provide some inspiration. Do you think there is more than one way to solve our problem? Point out/share any other books pulled for inspiration. [INVESTIGATE]

5. Now it's time to build! Split the group into small teams; ideally teams are made of three, but participants can do it independently or with a partner. Give the team ample time to create their designs and experiment with the materials. Some participants may find that they start a type of design, only to find that it doesn't assemble the way they expect it to, and need to start over. This is fine and is all part of the process. Iteration! [CONSTRUCT]
6. Provide time for a gallery walk so each participant can observe the other structures that can hold the apples.
7. Ask participants to explain how they came to their solution. Discuss and reflect on the process. Questions might include:
    - How did you come to this design?
    - Did it take you more than one try to have success?
    - What inspired your design?
    - What would you do differently next time?

    This reflection is an important part of the innovation process, and encourages participants to think critically about their decisions. [REFLECT and/or EXPRESS]
8. Participants are asked if they would like to share their design thinking via FlipGrid (provide an iPad with the FlipGrid app on it to provide ease of video creation) to encourage and assist other engineers of Curiosity Creek.
9. Encourage parents to send pictures to the library's social media #applesupontop to let us know each child's success.
10. Take pictures of each creation for the library--you may need these to promote your library's programming or as a basis for a future activity!

Modifications for All Learners:

- If space at the library permits, display pictures of the structures the participants created.
- This activity could be modified for older audiences by making it a competition-- for example, whose structure can support the most apples, tallest successful structure, etc.… Collect ideas from program participants.
- For older audiences, it may be helpful to offer a wider variety of materials, and have parents be spectators instead of being directly involved with the design process.

Assessment:

- Observation of design/iteration that goes into each structure will provide insight on the creative process.
- Completed structures will serve as an example of creativity and innovation.
- Participants' reflection on the process will reveal grasp of innovative thinking.

Credits:

CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- Talk a walk or ride with your family to explore different types of architecture in your neighborhood/town. Find similarities and differences in buildings.
- Borrow library books that have different types of buildings and pick your favorite building to talk about with your family member or sibling.
- Librarians may produce a coloring sheet with the apple orchard of Curiosity Creek and ask the following question:
    - Now that you've created a suitable structure to store your harvest, how can you share that with other Kids at CC? Can you encourage others to think creatively to solve a problem?
    - You may also want to submit pictures you have taken to submissions@curiositycreek.com to be featured on the Curiosity Creek website!
- Librarians should include the date and registration information/link/QR code for future programs

Attachments: (Session-Related Handouts / Activity Sheets and/or or Take-Home Material for Parents) - librarian responsible for the creation of take-home activities (optional)

Chapter 11: Program Sessions at Curiosity Creek Elementary School

Inspiring Invention Through Stories
Program Session #20:
The Curious Cuisine Cart

Title: The Curious Cuisine Cart

Topic: Engineering & Design, Communication Strategies

Literacy Standards:

- CCSS.ELA-LITERACY.RL.1.2: Retell stories, including key details, and demonstrate an understanding of their central message or lesson.
- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges.
- CCSS.ELA-LITERACY.RL.3.3: Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events.

Next Generation Science Standards:

- 1.Waves: Light and Sound: 1-PS4-4: Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Target age range: Second - fourth grades; ages 8-11

Number of participants: 15 to 25 (may be more or less depending on the available materials and staff)

Duration: 60 minutes (can be adapted for more or less time)

Problem-Based Scenario:

The Curious Kids are eating lunch one day at school in the cafeteria. They pull out their lunches and start discussing their favorite foods. Timmy shares that his favorite food is spacos. Confused, they ask what he means,

"What's a spaco?" Hector asks.

"It's spaghetti in a Taco!" exclaims Timmy.

Just then, overhearing their conversation, the kids at the table next to them start laughing at Timmy and his silly lunch. Ashamed, he hangs his head and regrets every word.

"Why are you laughing?" asks Hector, to the kids next to them. "That is very creative."

"Yes! That's a fabulous idea Timmy! It sounds delicious!" says Chen.

"He's right" says Tanisha, "that is a very unique creation, I wish everyone had the chance to taste it then they would see how delicious it must be!"

With that, Hector got an idea.

"Why don't we start a food cart? One that could travel all over Curiosity Creek with curious food! We could call it Curious Cuisine!" he exclaimed.

"That's a great idea! I love it!" said Tanisha and Chen at once.

But Timmy wasn't so sure. "How will people even know about it? And why would they want to try my food?" said Timmy.

"We need an invention." explained Hector, "One that will spread the word about your amazing food fast and convince people to try it!"

The Curious Kids need your help. Can you come up with a marketing plan to spread the word about the Curious Cuisine Cart as quickly as possible? How will your invention both spread the word about the cart and convince people to try Timmy's food?

Brief Overview: Participants will come up with a way to stop a giant robot from destroying Curiosity Creek. Based on the story *Spaghetti on a Hot Dog Bun: Having the Courage to Be Who You Are* by Maria Dismondy, participants will develop a marketing plan/design an invention that will allow them to communicate with a large number of people quickly, while also utilizing light and/or sound. They will learn about how light and sound travels and why it is useful in communication devices. In the process, participants will develop a sense of empathy while reading about the differences between all people.

Essential Question: How can you effectively communicate with a large number of people using light and/or sound?

Big Ideas:

- Participants will relate to the story *Spaghetti on a Hot Dog Bun* by understanding the main characters struggle with being different and having the courage to be themselves.
- Participants will identify problems and solutions in the read-aloud to advise their decisions when designing an invention to market the Curious Cuisine Cart.
- Participants will identify characteristics they feel are most important for their invention to possess based on brainstorming sessions discussing how light and sound relate to the ability to communicate with large numbers of people.
- Participants will create/design an invention with the purpose of communicating with a large number of people (both spreading the word and encouraging people to try curious cuisine) and explain why it would be effective. To further this activity (or adjust for younger audiences), students may create the menu for the Curious Cuisine Cart, including curious foods of their own imagination!
- Participants will reflect on their invention/design during discussion and give/receive feedback for improvement.

Literary and/or Informational Text(s):

- Literary: *Spaghetti in a Hot Dog Bun: Having the Courage To Be Who You Are*, by Maria Dismondy
- (optional) Non-Fiction & Informational: Copies of books on light and sound (waves/communication devices)

Vocabulary:

- Light waves: (electromagnetic waves - or electromagnetic radiation) waves made of oscillating magnetic and electric fields.
- Sound wave: a wave of compression and rarefaction, by which sound is propagated in an elastic medium such as air.
- Communication: the imparting or exchanging of information or news.
- Marketing: the action or business of promoting and selling products or services, including market research and advertising.

- Design/invent: a plan or drawing produced to show the look and function or workings of something.
- Schematic/sketch: a diagram, representation, or plan - symbolic and simplified

Content or Background Information:

Participants may or may not be familiar with the characters of Curiosity Creek. You may want to brief them on the characters before beginning the session. Participants may also need more support in designing their invention. Spend some time connecting science, light, and sound principles. Encourage them to think about how they could use light and sound to reach large numbers of people. You may choose to have non-fiction books of your choice explaining some of these principles.

Materials and Preparation:

- Copies of the texts listed above - You may choose to have multiple copies of the texts for participants to look through on their own when designing their invention. This will help them explore further and get a more hands on experience.
- A variety of construction supplies to build a prototype of their invention. Others may choose to sketch their invention. Include the following items if possible for prototype construction (but not limited to):
    - Recyclables (bottles, cans, plastic, containers, etc.)
    - Glue and tape, glue gun/sticks if desirable
    - Scissors
    - Crayons/paint/colored pencils
    - Toilet paper tubes/other cardboard materials
    - Construction paper
    - Blocks/scrap wood pieces
    - Pom-poms/cotton balls/styrofoam
    - Toothpicks/popsicle sticks
    - Pipe-cleaners
    - Googly eyes/decorative materials
    - Paint
    - Handout for parents with at-home ideas (simple and self-created with library links/information to register for upcoming programs)

Procedures:

1. Welcome the participants and start the session by explaining that the Curious Kids need help spreading the word about their new Curious Cuisine Cart! Introduce the problem-based scenario using the illustration found on page 160. If participants have never before heard of Curiosity Creek, some of the characters may need to be introduced. This will engage the students and help them relate to the characters when completing the mission.
2. To help the group brainstorm ideas to help solve the problem-based scenario, read to them at least one of the texts listed on page 164.
3. After hearing their situation, participants will imagine what it would be like to

have a Curious Cuisine Cart in their town, including imaginative foods they've never tried before! Would you try the food? Can you think of some initial possibilities to add to the menu? (Hold those thoughts! That's for later!) Start thinking about your invention and what it could possibly do to communicate with a large number of people all throughout Curiosity Creek. [CONNECT]

4. Before brainstorming possible solutions, help participants imagine what this adventure would be like by reading the book *Spaghetti in a Hot Dog Bun* by Maria Dismondy. What happened in the book? Do you think the main character struggled with her decisions? Why or why not? What goes wrong? How did she fix it? End the discussion by talking about why we are all different and why that is so important to remember throughout our lives. [INVESTIGATE]
5. Participants will then brainstorm possible solutions to this problem. They should ask themselves what kind of invention they want to make. What characteristics should it have? Before getting too far into the brainstorming, bring participants back together and have a discussion about the power of light and sound. How could using light and/or sound help us communicate? How could this help us with our marketing plan? Why are light and sound so powerful when it comes to getting people's attention? How can we add this into our initial ideas? You may choose to give participants various non-fiction texts about light and sound for further exploration at their own pace. [WONDER]
6. Participants will then plan their invention in the form of a schematic/sketch. They may choose to add words to describe specific parts of their device/invention, or simply explain this aloud during the sharing session. Participants can then name their invention based on its characteristics. The instructor may also choose to give an example or share his or her own at the end, as not to interfere with the participant's designs. To enhance this activity, you may choose to have various construction materials available for participants to actually build their invention in a prototype version. Parents may be able to assist in this portion of the session (helping with supply management, not necessarily building the prototype, as that should be solely student created). This portion of the session will take the most time. [CONSTRUCT]
7. When everyone has completed their design/prototypes gather as a whole group and have participants share their creations. What did you create and why? Reflect on the choices participants made and how they believe they could market the Curious Cuisine Cart. Participants may choose to tell the ending of the story and how their invention ended up successfully advertising/marketing the cart and sharing Timmy's imaginative food creations! This story telling session will not only help participants reflect on their own process, but also help them compare their choices with others.
8. End this session with participants pairing up and discussing what they could have done differently to improve their design. If they have time, you could also have participants create the Curious Cuisine Cart's Menu, using their own imaginations to create some interesting food combinations! [REFLECT and/or EXPRESS]

9. Be sure to record session experiences, including but not limited to student quotes, pictures, invention designs, etc. and share them on the library's website to promote future sessions.

Modifications for All Learners:

- You may also choose to print out visuals of the Curiosity Creek characters to help participants visualize the problem/mission, including the character descriptions of each character. A video could be shown fully explaining the principles of light and sound for students that may need a more interactive medium for non-fiction content. Give examples of current communication devices and why they are successful.
- This session was designed for participants to choose whether they wanted to create a 2D design and/or 3D design. However, you may choose for participants and limit materials based on whether you want them to create only a sketch. This may be easier for younger participants who may struggle with construction.
- You may need to give younger participants more instruction/guidance when beginning the design process. You could provide examples of what a similar design may look like, or even show a prototype of a made-up device. Be sure to show a couple options so participants do not just copy one.
- Participants may also create the Curious Cuisine Cart's Menu, developing imaginative and unique food combinations, instead of inventing a communication device.

Assessment:

- Participants' designs/prototypes may be observed to assess understanding (creativity, development, chosen invention, etc.)
- Participants' reflection on the process, including story development(finishing the story and explaining how they completed the mission) and the reasoning behind their chosen invention/communication device will help evaluate participants based on the design process, as well as their problem-solving techniques.

Credits:

CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- *Extended Learning:* Create the menu for the Curious Cuisine Cart! What would you include? Have you ever tried a food that someone else thought was "weird" but you love? Let your imagination run wild!
- *Submit your invention sketch to submissions@curiositycreek.com to be featured on the Curiosity Creek website!*
- Include registration information for future sessions.

Attachments: Curiosity Kid character guide, session-related handouts, activity sheets and/or take-home materials for parents, menu template for students to take home and

complete for extension - librarian responsible for the creation of take-home activities (optional).

Inspiring Invention Through Stories
Program Session #21:
The Science Fair Disaster

Title: Science Fair Disaster

Topic: Science and Engineering/ Programming

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.1: Ask and answer such questions as *who, what, where, when, why*, and *how* to demonstrate understanding of key details in a text.
- CCSS.ELA-LITERACY.RL.2.3: Describe how characters in a story respond to major events and challenges.
- CCSS.ELA-LITERACY.RL.2.7: Use information gained from the illustrations and words in a print or digital text to demonstrate understanding of its characters, setting, or plot.

Next Generation Science Standards:

- K-2 - ETS1 - Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a problem.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Katie McGinnis

Target age range: Second - fourth grades; ages 8-11 years

Number of participants: 15 to 25 (can be more or less depending on available material)

Duration: 60 minutes (can be adapted for more or less time)

Problem-Based Scenario:

The Curious Kids are on their way to the school's annual science fair! They can't wait to see all of the inventions their classmates have created. One classmate in particular has been telling them about her personal robot all week! However, when they arrive to the elementary school they find it in chaos. Everyone is running away from the school! Eager to help, the Curious Kids sprint into action! What could be happening? Mac, who was already on the scene gathering information, explains how a science fair project meant to help plants grow, accidentally spilled, leaking onto their friend's robot that they were so eager to see! The robot was now growing at an indefinite rate! Can the Curious Kids come up with a way to stop the robot from destroying Curiosity Creek? They need your help!

Brief Overview:

Students will come up with a way to stop a giant robot from destroying Curiosity Creek. Based on the book *Oh No! (Or How My Science Project Destroyed the World)* by Mac Barnett, students will design an invention to stop the destruction of their home. Students will invent something to stop the robot, either by shrinking it back to its original size or defeating it using specific characteristics pre-programmed into the invention.

Essential Question: How would you stop a giant robot from destroying the world?

Big Ideas:

- Participants will relate to the story *Oh No!* by understanding the need to protect one's home.
- Participants will identify problems and solutions in the read-aloud to advise their decisions when designing an invention to stop the giant robot.
- Participants will identify characteristics/skills they feel are most important for their inventions to possess based on brainstorming sessions discussing what makes us know right from wrong (even if students are not planning on designing another robot to defeat the giant robot, this discussion will help students consider what makes us human and why).
- Participants will create/design an invention (robot, device, etc.…) and explain how/why it could stop the giant robot.
- Participants will reflect on their invention/design during discussion and give/receive feedback for improvement.

Literary and/or Informational Text(s):

- Literary: *Oh No!: Or How My Science Project Destroyed the World*, by Mac Barnett

Vocabulary:

- Characteristics: a feature or quality belonging typically to a person, place, or thing and serving to identify it.
- Programming: the action or process of writing computer programs.
- Design: a plan or drawing produced to show the look and function or workings of something.
- Schematic/sketch: a diagram, representation, or plan - symbolic and simplified.

Content or Background Information:

Participants may or may not be familiar with the characters of Curiosity Creek. You may want to brief them on the characters before beginning the session. Participants may also need more support in designing their invention. Encourage them to think of solutions other than building another robot. While many participants may choose to invent a robot and list characteristics that could stop the giant robot, how could they

use the skills they already have or the characteristics they already possess to stop the robot? This could also act as an extension activity.

Materials and Preparation:

- Copies of the text listed above – You may choose to have multiple copies of the text for participants to look through on their own when designing their invention. This will help them explore further and get a more hands on experience.
- A variety of construction supplies to build a prototype if they wish. Others may choose to sketch their invention. However, some may want to take a more hands on approach. Include the following items if possible (but not limited to):
    - Glue and tape, glue gun/sticks if desirable
    - Scissors
    - Crayons/paint/colored pencils
    - Toilet paper tubes/other cardboard materials
    - Construction paper
    - Blocks/scrap wood pieces
    - Pom-poms/cotton balls/styrofoam
    - Toothpicks/popsicle sticks
    - Pipe-cleaners
    - Googly eyes/decorative materials
    - Handout for parents with at-home ideas (simple and self-created with library links/information to register for upcoming programs)

Procedures:

1. Welcome the participants and start the session by explaining that the Curious Kids need their help getting their science fair back on track! Introduce the problem-based scenario using the illustration found on page 168. If participants have never heard of Curiosity Creek, some of the characters may need to be introduced. This will engage the students and help them relate to the characters when completing the mission.
2. After hearing their situation, participants will imagine what it would be like to see a giant robot roaming their town, nearly destroying everything in sight! What would it be like? How would you feel? What would you do first? [CONNECT]
3. Before brainstorming possible solutions, help participants imagine what this adventure would be like by reading the book *Uh Oh!* by Mac Barnett. What happened in the book? Do you think the main character came up with a successful solution? Why or why not? What goes wrong? What could you do differently? End the discussion by talking about what characteristics make us human and more importantly know the difference between right and wrong.
4. Students will then brainstorm possible solutions to this problem. They should ask themselves what kind of invention they want to make. Will it be a device or

another robot? What kind of skills or characteristics should it have? Can it fly? Can it climb? Can it knock the tree down? Can this animal defend itself? How can it defend itself? Can the animal successfully pick up the mechanical fish with Hector inside? Can it keep it safe? How will it get down? How does it travel? How will you guarantee your invention will "function" correctly? [WONDER]

5. Participants will then plan their invention in the form of a schematic/sketch. To create this they may have to complete a couple drafts. They may choose to add words to describe specific parts of their device/invention, or simply explain this aloud during the sharing session. Participants can then name their invention based on its abilities, skills, or characteristics. The instructor may also choose to give an example or share his or her own at the end, as not to interfere with the participant's designs. To enhance this activity, you may choose to have various construction materials available for students to actually build their invention in a prototype version.
   Parents may be able to assist in this portion of the session (helping with supply management, not necessarily building the prototype, as that should be solely student created). This portion of the session will take the most time! [CONSTRUCT]
6. When everyone has completed their design/prototypes gather as a whole group and have participants share their creations. What did you create and why? Reflect on the choices participants made and how they believe they could save Curiosity Creek. Participants may choose to tell the ending of the story and how their invention ended up saving the town! This storytelling session will not only help participants reflect on their own process, but also help them compare their choices with others. [REFLECT and/or EXPRESS]
7. End this session with participants pairing up and discussing what they could have done differently to improve their design.
8. Be sure to record session experiences, including but not limited to student quotes, pictures, invention designs, etc. and share them on the library's website to promote future sessions.

Modifications for All Learners:

- You may also choose to print out visuals of the Curiosity Creek characters to help participants visualize the problem/mission, including the character descriptions of each character.
- This session was designed for participants to choose whether they wanted to create a 2D design and/or a 3D design. You may choose for students and limit materials based on whether you want them to create only a sketch. This maybe easier for younger participants who may struggle with construction.
- You may need to give younger participants more instruction/guidance when beginning the design process. You could provide examples of what a same design may look like, or even show a prototype of a made-up device. Be sure to show a couple options so participants do not just copy one.

Assessment:

- Participants' designs/prototypes may be observed to assess understanding (creativity, development, chosen invention, etc.)
- Participants' reflection on the process, including story development (finishing the story and explaining how they completed the mission) and the reasoning behind their chosen invention (including characteristics - if a robot, defenses, skills, techniques, etc.) will help evaluate participants based on the design process, as well as their problem-solving techniques.

Credits:
Oh No! (Or How My Science Project Destroyed the World) by Mac Barnett
CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- *Extended Learning:* Imagine it wasn't just the robot that grew giant at the fair, but every science fair project in the school! What would you do? How would your invention change? What science fair projects would be the most dangerous if they grew? What would be the coolest?
- *Submit your invention sketch to submissions@curiositycreek.com to be featured on the Curiosity Creek website!*
- Include registration information for future sessions

Attachments: Curious Kid character guide, session-related handouts, activity sheets and/or take-home materials for parents - librarian responsible for the creation of take-home activities (optional)

Inspiring Invention Through Stories
Program Session #22:
The Curious Kids Invent

Title: Curious Kids Invent

Topic: Engineering, Science, Social Emotional Learning

Literacy Standards:

- CCSS.ELA-LITERACY.SL.1.5: Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.
- CCSS.ELA-LITERACY.SL.1.1: Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
- CCSS.ELA-LITERACY.RI.2.3: Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

Next Generation Science Standards:

- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Leslie Pcolinsky

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: This activity is designed for individuals or individuals and their parent/caregiver.

Duration: 60 minutes

Problem-Based Scenario:

The Kids of Curiosity Creek have a new student in their class named Alex. Alex is an expert on many topics such as rockets and bridges. The Curious Kids notice that he has some qualities that make him unique. Alex likes to talk and make friends, but he doesn't like to make eye contact and wears ear protection during recess. The Curious Kids have questions for their teacher and for Alex. Their teacher decides that it's a good idea to teach the Curious Kids about what makes each child unique, as well as teaching them about autism. After reading some books about visual thinking and autism, the Curious Kids are tasked with designing a blueprint of an invention that makes them feel better when they are feeling bad, excited, overly stimulated, sad, or scared.

The Curious Kids are excited to have a new classmate and learn about what makes each of them, "different, not less" and to invent something unique for and about themselves.

Brief Overview:

In this session, participants will think about themselves, their own unique traits/qualities, explore how Temple Grandin thinks in pictures, describe an invention that Temple Grandin created, and then think about an invention that would help them in their daily lives. The session includes a mini-lesson on autism.

After listening to two read-alouds, participants will design an invention designed to make them feel better about something in their life. It will also help the Curious Kids and their new friend explore what it's like to think in pictures and what makes them "Different, not less." Participants can respond with a written response or a pictorial response.

Essential Question/Problem: Can you invent something to make yourself feel better when your feeling lousy? How can you invent something to make your life better?

Big Ideas:

- Participants will think about what it's like to "think in pictures."
- Participants will express their thoughts by drawing pictures.
- Participants will understand the concept of empathy.
- Participants will create an invention to make them feel better.

Literary and/or Informational Text:

- Literary: *Uniquely Wired: A Story About Autism and Its Gifts*, by Julia Cook (Illustrated by Anita DuFalla)
- Non-Fiction & Informational: *The Girl Who Thought in Pictures: The Story of Dr. Temple Grandin*, by Julia Finley Mosca (Illustrated by Daniel Rieley)

Vocabulary:

- *Autism* - a developmental disorder of variable severity that is characterized by difficulty in social interaction and communication and by restricted or repetitive patterns of thought and behavior.
- *Invention* - the action of inventing something, typically a process or device.
- *Empathy* - the ability to understand and share the feelings of another.
- *Social Emotional Learning (SEL)* - is the process through which children and adults understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions.

Content or Background Information:

- All children learn together in today's educational system. Social emotional learning and well-being are important for children to feel safe and welcome in a learning environment. (Maslow's hierarchy of needs)
- All children need to learn to self-regulate. Children with autism have self-regulation techniques that tend to be different from neurotypical children.
- All children want to be included and accepted. Provide kids with "windows and mirrors" to see who they are and to see others.
- Create a sense of community and acceptance for all patrons.
- Background knowledge of Curiosity Creek and the Curious Kids will help, but is not entirely essential.
- A "sensory-friendly" environment will allow all patrons to feel safe and comfortable during each session.

Materials and Preparation:

- Copies of the texts listed above.
- Librarian will stage (on a table) other age-appropriate and diverse texts from the library collection focused on invention, differently-abled children, math, science, innovation, engineering, and technology. These will inspire brainstorming and creativity, as well as be available for check out after the session. Some titles to include are: *How to be a Math Genius: Your Brilliant Brain and How to Train It* by Mike Goldsmith, *I Am Enough* by Grace Byers, *A Computer Called Katherine: How Katherine Johnson Helped Put America on the Moon* by Suzanne Slade.
- Paper and colored pencils/markers
- Whiteboard or digital display or chart paper and markers
- Handout for parents with at-home ideas (simple and self-created with library links/QR codes/information to register for upcoming programs)

Procedures:

1. Welcome the group and introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids. Feel free to use the illustration found on page 174 to describe the scenario.
2. Engage participants in a discussion around what makes them unique.

Participants will brainstorm many ideas and I'm sure that some will evoke laughter from the group. Continue the discussion by asking participants how they work out solutions to their problems. Ask: How does that make you feel? Do you ever come up with unique solutions that are different from your friends' solutions? [CONNECT]

3. Introduce *The Girl Who Thought in Pictures: The Story of Dr. Temple Grandin* by Julia Finley Mosca (Illustrated by Daniel Rieley) and read it aloud. [WONDER]
4. After you read the book, write the following on the chart paper: Temple's mother told others that she was, "Different, not less." What did she mean by that statement?
5. Distribute paper and markers to patrons and allow them to write down their interpretation of that statement. Encourage participants to draw pictures to accompany their words or instead of their words (for younger participants). [INVESTIGATE]
6. Read the second book aloud: *Uniquely Wired: A Story About Autism and Its Gifts* by Julia Cook (Illustrated by Anita DuFalla).
7. Continue the discussion while answering any questions the participants have about autism.
8. Participants can now design a blueprint for an invention that, like Temple's invention did, calms you down. [CONSTRUCT]
9. Ask participants to write about and draw a picture of their invention and how it makes them feel better.
10. Ask participants to display their pictures around the room.
11. Have participants provide feedback to each other using sticky notes and ask them to use the stems: I like…, I wonder…, I wish… Using this technique allows participants to share feedback in a positive and non-threatening way and allows the creators to share their ideas without feeling vulnerable or shy in front of others they may not know.
12. This session helps participants understand and reflect on their own social and emotional strengths and weaknesses, while reinforcing that all participants are unique and we all have our own gifts to share regardless of our specific abilities. [REFLECT and/or EXPRESS]
13. Use your social media accounts and hashtags to share pictures of participant's blueprints. Take pictures of the blueprints for the library--you may need these to promote your library's programming or as a basis for a future activity!

Modifications for All Learners:

- If time permits, elicit ideas from patrons to expand on their blueprints.
- Ask for feedback from participants and parents about additional programming ideas for other sessions around differently-abled patrons.
- For younger audiences, it may be helpful to allow them to draw or verbally share their invention blueprints.

Assessment:

- Completed blueprints will serve as an example of creativity and innovation, and will provide participants with the opportunity to reflect on their ideas and other participants ideas.
- Participants' reflection on the process will reveal grasp of innovative thinking.

Credits:

- CuriosityCreek.com
- Adapted from a lesson found here: The Girl Who Thought in Pictures

Family Literacy Element (ideas for at home follow-up):

- Librarians can encourage parents/caregivers to continue the conversation at home as many participants will have additional questions.
- Librarians may produce a very simple handout with the following prompt:
    - *How does your unique ability or quality make you "different, not less"?*
    - *Would you encourage your friends to create a blueprint of an invention that helps them feel better when feeling bad?*
    - *How can you be understanding to your friend's uniqueness?*
- Librarians should include the date and registration information/link/QR code for future programs.

Attachments: (Session-related handouts /activity sheets and/or take-home material for parents) - librarian responsible for the creation of take-home activities (optional)

Chapter 12: Program Sessions at Curiosity Creek

Inspiring Invention Through Stories

Program Session #23:
Penny Boat Challenge

Title: Penny Boat Challenge

Topic: Engineering-design and fabrication

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.1: Ask and answer such questions as *who, what, where, when, why*, and *how* to demonstrate understanding of key details in a text.
- CCSS.ELA-LITERACY.RL.2.2: Recount stories, including fables and folktales from diverse cultures, and determine their central message, lesson, or moral.

Next Generation Science Standards:

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Gabby Fountain

Target age range: 5-8 years old; kindergarten to second grade

Number of participants: ideal group size is 2-4 children, but you can have multiple groups. 15-20 children recommended, but you may accept more if additional staffing is available.

Duration: 45-60 minutes

Problem-Based Scenario:

While Timmy was on YouTube he found a funny video of a squirrel water-skiing and decided to show his friends, the Curious Kids. Everyone was enjoying the video, especially Muff, when Chen began to wonder if he could make a boat. How much weight could it hold? Tanisha became interested and started researching examples of buoyant animals and watercrafts. Using their creative engineering skills, the Curious Kids decided that they are going to create fun mini-boats and watercrafts for the Creek Crafts Boating Company. They will host a competition and test out their mini watercrafts. The Creek Crafts Boating Company's main product is aluminum, but the Curious Kids want to upgrade their design so that it will be able to hold the most cargo (pennies). Can the shape of the boat affect the amount of buoyancy it has? Will the materials used in the building process affect buoyancy? Working together in teams the Curious Kids will use the engineering design process to come up with the best design of a boat that will hold the most pennies. Can you help the Curious Kids figure this out?

Brief Overview:

In this activity, participants will devise an innovative way to improve a mini watercraft that will hold the most cargo. After reading books about crossing water and reviewing different types of animals and watercrafts that float, the group will create mini versions of watercrafts that will be tested with various materials. Participants will work in pairs or groups to design, create, and test their own solutions. A reflection based show and tell at the end of the process will give participants the chance to share their mini watercrafts and their results/solutions.

Essential Question: Can the shape or constructive materials of a boat affect its buoyancy?

Big Ideas:

- Participants will collaborate with their partners to generate, share, and listen to ideas, and work cooperatively towards a solution.
- Participants will apply their ideas to build and test a novel creation.
- Participants will reflect on their creations and generate ideas for future improvement.

Literary and/or Informational Text(s):

- Fiction & Literary: *The Gingerbread Boy*, by Paul Galdone. *The Gingerbread Boy*, by Mara Alperin. *The Gingerbread Boy*, by Richard Scarry. *The Gingerbread Boy*, by Jim Aylesworth. *One Proud Penny*, by Randy Siegeln (any version)
- Non-Fiction & Informational: *What Floats in a Moat?*, by Lynne Berry. *Let's Try It Out In the Water*, by Seymour Simon. *Boats, Ships, Submarines, and Other Floating Machines*, by Ian Graham (optional)

Vocabulary:

- Buoyancy - the ability or tendency to float in water
- Surface Area - is the amount of the liquid that is exposed to the air or touching the air

Content or Background Information:

- This activity is based on the idea of testing the engineering process. Using given materials and adding flair to create a mini watercraft that will hold the most cargo.
- Buoyancy is the upward force that keeps things afloat. When placed in water, an object will float if its buoyancy is greater than its weight. And it will sink if its weight is greater than its buoyancy.
- The more types of materials you have available for crafting, the more creatively participants will be able to express themselves!
- Background knowledge of Curiosity Creek and the Curious Kids will help students relate to the problem-based scenario.

Materials and Preparation:

- Copies and visuals of the key vocabulary words
- Librarian will pull books from the library collection focused on boats, buoyancy, and water animals, and water safety for children to research, explore, and make connections with other buoyant crafts and animals to inspire brainstorming and creativity.
- Aluminum foil
- Pennies - at least 50-100 per group which is either $.50 or $1.00 - librarian will have to prep and either count pennies or go to the bank for a roll of pennies.
- Large bins, plastic totes, cake pans
- Large ball bearing for demo
- A wide variety and quantity of craft supplies for participants to create their own creations, such as
    - Glue and tape
    - Scissors
    - Straws
    - Paper plates
    - Cardboard
    - Popsicle sticks and/or toothpicks
    - Paperclips
    - Streamers

Procedures:

1. Welcome the group. Ask the students if they have ever seen large ships such as naval vessels or ocean liners, and what materials are used to make these ships. Tell them that these ships are made of steel and iron. Drop a ball bearing into the tub of water and have them observe that it sinks. Ask why this sinks if boats float. Explain that the steel in the ship is distributed over a larger surface area. [INVESTIGATE] [WONDER]
2. Introduce the problem-based scenario, providing any necessary background on Curiosity Creek and the Curious Kids and using the illustration on page 180.
3. Read a version of *The Gingerbread Boy*. Show a clip of the squirrel water skiing (https://youtu.be/dVfXF8O-lHw) and some other visuals of boats.
4. Brainstorm with the group what may be important materials needed for a mini watercraft. What materials would be buoyant? What will absorb water? What shape is best, big or little? The librarian should show examples of what they have around their library, and then ask the children to answer the questions. After examples are shown, participants will be split into groups.
5. Sketch a mock-up design. Your mini watercraft invention could be based off a previous model but try to make it one of a kind.
6. Make your model. Predict how much cargo (pennies) it can hold. [CONSTRUCT]
7. Provide groups with aluminum foil sheets;
   make sure sheets are equal in size to ensure fairness. One sheet could be to test out their design and the other is for the final boat.
8. Give ample time for creation and decoration.
9. Have the group count out and distribute the same amount of cargo (pennies) to everyone, so the cargo is the same weight.
10. Partially fill large tub/tote with water.
11. When everyone has completed their boat reconvene the group to test their mini watercrafts. You can either have them test out a certain a mount of pennies or do one penny at a time and count how many they have after boat has sunk. This depends on the amount of time you have. [REFLECT and/or EXPRESS]
12. After all have shared and tested out, ask them questions. What material worked the best? What shape worked the best? What would they do differently next time? This reflection is an important part of the innovation process and encourages participants to think critically about their decisions.
13. Ask the students why they believe the winning watercraft could hold the most cargo.
14. Take picture of each creation for the library - you may need these to promote your library's programming and future activities!

Modifications for All Learners:

- This program could be a messy one. To save time and provide modifications to mini watercrafts, have aluminum foil already measured and cut into 12” x 12” squares. If there is carpet, lay an old tarp or plastic shower curtain down to prevent big spills or do the testing outside.
- Brainstorm with the librarian aloud different ways to make the boats float (such as forming the foil into a cup shape), and the group could test some of these together/on their own.

Assessment:

- Ask the participants if they have ever seen large ships such as naval vessels or ocean liners and what materials are used to make these ships. Tell them that these ships are made of steel and iron. Drop a ball bearing into the tub of water and have them observe that it sinks. Ask why this sinks if boats float. The goal is for the participant to explain that the steel in the ship is distributed over a larger surface area.
- Participant’s creations may be observed to assess understanding of buoyancy, surface area, and creativity.

Credits:

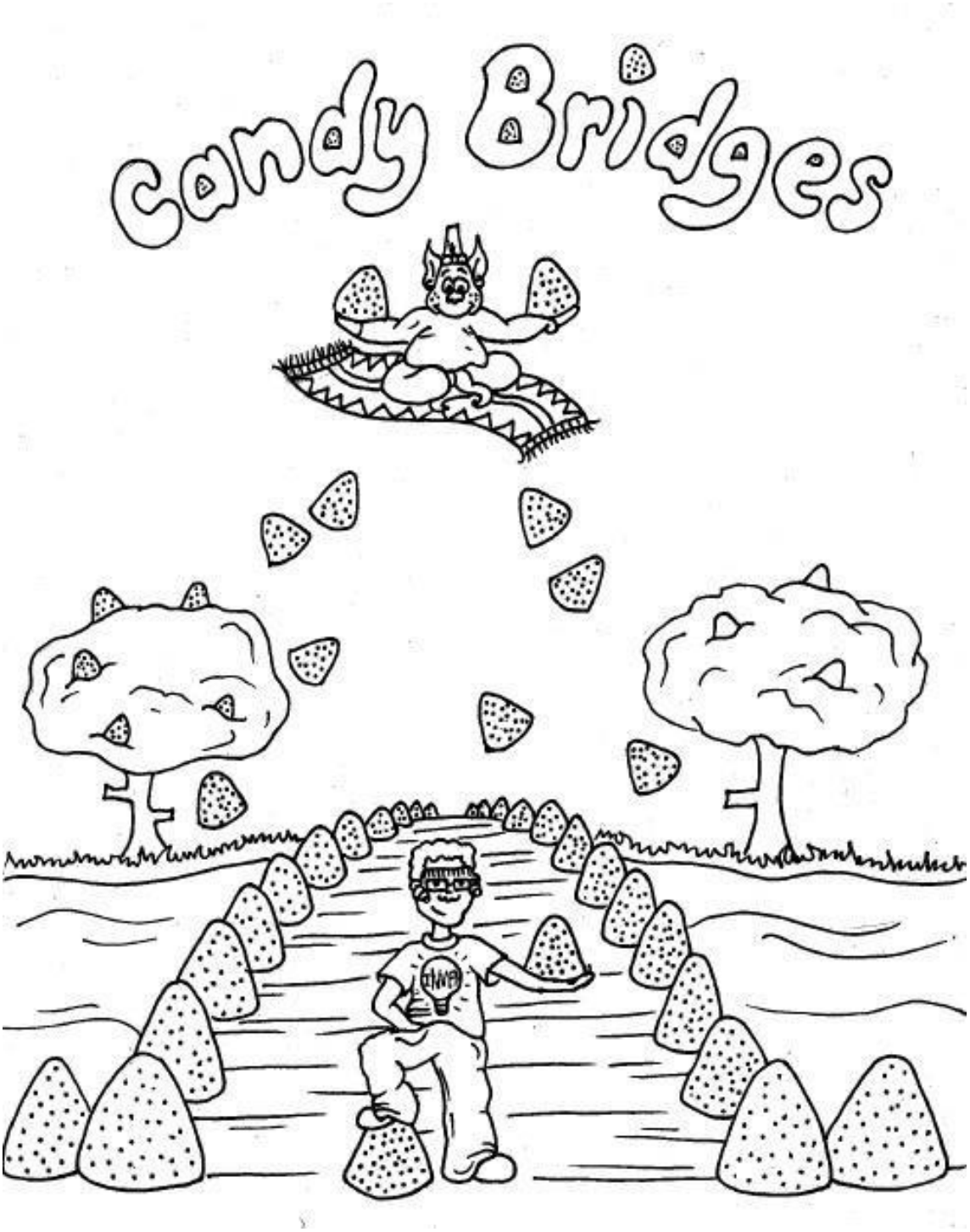
CuriosityCreek.com

Family Literacy Element (ideas for at home follow-up):

- Try this activity at home as a family. You may use similar materials to design a boat that could carry a bigger toy.

Attachments: (Session-Related Handouts/Activity Sheets and/or or Take-Home Material for Parents) - librarian responsible for the creation of take-home activities (optional)

Inspiring Invention Through Stories
Program Session #24:
The Curious Kids Build Candy Bridges



Title: Curious Kids Build Candy Bridges

Topic: Geometry & Engineering

Literacy Standards:

- CCSS.ELA-LITERACY.RL.2.1: Ask and answer such questions as *who, what, where, when, why*, and *how* to demonstrate understanding of key details in a text.
- CCSS.ELA-LITERACY.RL.2.2: Recount stories, including fables and folktales from diverse cultures, and determine their central message, lesson, or moral.

Next Generation Science Standards:

- K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Engineering Design Process: Ask, Imagine, Choose & Plan, Create/Build, Improve & Share

Stripling Inquiry Model: Connect, Wonder, Investigate, Construct, Express, Reflect

Author: Stephanie Prato

Target age range: Kindergarten - second grade; ages 5-8 years old

Number of participants: 12 participants recommended - may accept more depending on materials and available staff.

Duration: 30-45 minutes

Problem-Based Scenario:

Curiosity Creek has many fun places to visit, but there is only one bridge that spans the creek. Hector wants to build additional bridges, so the kids can travel from place to place, faster. The bridges must be strong and safe for the Curious Kids and Digger to cross. Hector asks Teenie Genie to provide the materials to build the bridge. Teenie Genie loves stories and has just finished reading *Hansel and Gretel*, so he gives Hector...gumdrops! Can you help Hector build a strong bridge out of candy, so they can safely cross Curious Creek?

Brief Overview:

In this activity, participants will practice the engineering design process by creating and testing bridges made out of gumdrops and toothpicks. After reading a literary text about Iggy Peck, a young boy who constructs a bridge to save his class on a field trip, the group will think about different shapes and their relative strengths. Next, use the informational text (optional) *Building Bridges* to learn a bit more about how bridges are constructed and to think about the shapes that make them strong. In a warm up activity, have children construct different shaped columns out of paper and test their strengths. Using what they learned, they will use their creativity to build the strongest bridge they can out of 10 gumdrops and 20 toothpicks. A reflection discussion at the end of the process will give participants the chance to share their creations and reflect on the process.

Essential Question: Which shape will allow us to build the strongest bridge?

Big Ideas/Learning Outcomes:

- Students will apply scientific and engineering ideas to design, evaluate and refine three different shaped paper structures (triangle, circle and square) in order to discover which shape is the strongest (show visuals to provide examples).
- Students will apply these concepts to construct the strongest possible structure/bridge out of gumdrops and toothpicks, and then test their designs. If time allows, students can make modifications to their structures and test them again.

Literary and/or Informational Text(s):

- Literary: *Iggy Peck Architect*, by Andrea Beaty
- Non-Fiction & Informational: *Building Bridges*, by Tammy Enz (optional)

Vocabulary:

- *Load* - weight carried or supported by the engineered structure
- *Load Capacity* - total amount of load a structure can handle before the structure possibly breaks

Content or Background Information:

- This activity is a design/engineering challenge in action, and there are multiple ways to solve this problem, however triangles are the strongest shape to use. (Allow participants to experiment and find this out for themselves.)
- Participants should be encouraged to discuss ideas before beginning construction. This will help them experience the "Imagine" and "Choose & Plan" steps of the design process. The warm-up activity will also help them think through design options.
- Expect students to create a prototype, test it, and then iterate on it, if need be. To minimize frustration, start by testing structures with something lighter (like a single book) and then add to the load.

- Background knowledge of Curiosity Creek and the Curious Kids will help, but is not essential.

Materials and Preparation:

- Copies of the texts listed above
- 3 sheets of paper PER PAIR (pair students up for this warm up activity to useless paper)
- Tape
- 10 gumdrops & 20 toothpicks PER PARTICIPANT (multiply by number of children in the session)
- Hardcover books (to test the strength of the structures)
- Handout for parents with at-home ideas (simple and self-created with library links/QR codes/information to register for upcoming programs)

Procedures:

Warm-up Activity: Testing Shapes and Columns (5-10 minutes). Begin by introducing the problem-based scenario with the illustration found on page 186 and reading *Iggy Peck Architect* by Andrea Beaty to inspire students to think creativity and learn what an architect really does. Before you jump into bridge building, do this activity with participants to get them thinking about shapes and their various strengths. [CONNECT]

1. Ask students to name common shapes. Which ones have they seen in architecture and building (refer to the literary and informational texts).
2. Tell them that today they will get to test the relative strengths of different shapes.
3. Identify three shapes to test: circle, square, triangle
4. Formulate a hypothesis as to which shape will have the largest load capacity.
5. Split the class into pairs of two. Have the pairs of students fold and tape sheets of paper into three different types of columns: one that is a tube, one that is rectangular, and one that has a triangular shape. (See Figure 2, credit: US Space & Rocket Center*) [WONDER]
6. Test the structures by applying one hardcover book at a time. Record the load capacity (number of books it could hold before collapsing) and compare the results to your hypothesis. [INVESTIGATE]

Building Candy Bridges

7. Ask the participants to think about what they just learned and use that knowledge in the next challenge.
8. Remind them of the problem-based scenario with the Curious Kids. [CONSTRUCT]

9. Give each child 10 gumdrops and 20 toothpicks and 15-20 minute to build their structures. Remind them to be creative.
10. When they are ready, apply the load one book at a time to see how strong their structures are. Is the bridge strong enough to safely carry the Curious Kids and Digger?
11. Allow them to share their designs and their results with the other participants.
12. If time allows, let them add to or modify their designs and test them again. [REFLECT and/or EXPRESS]

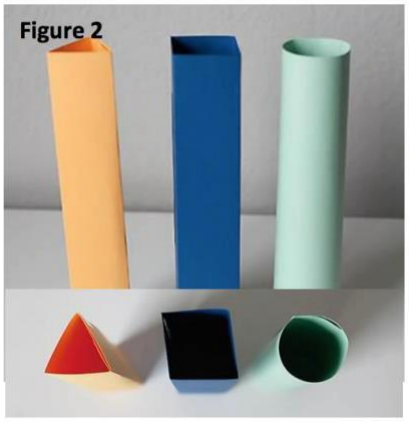


Figure 2

Modifications for All Learners:

- Instead of using gumdrops and toothpicks, you could use spaghetti and marshmallows (the marshmallows work best if slightly stale)
- To create longer bridges, or if you have a smaller group you can try doubling the amount of materials allotted to each participant (20 gumdrops, 40 toothpicks)
- For younger participants (if you have more kindergartners in your group) consider keeping them in pairs for the bridge building activity.

Assessment:

- Observe the initial bridge designs. Did they take what they learned about triangles being the strongest shapes into account with their design?
- Observe the design process and how they iterate on that design to demonstrate the level of creativity and innovation.
- How do participants reflect on their work and share it with the group? Are they able to articulate the strengths and weaknesses of their bridge and how it performed?

Credits:

CuriosityCreek.com

There are numerous other versions of this activity on the web and you can find many videos, samples and additional modifications by googling “gumdrop building challenge” or “engineering with geometry”, etc... The image of the paper column shapes came from this lesson plan* by US Space and Rocket Center.

Family Literacy Element (ideas for at home follow-up):

- Towards the end of the session, invite parents into the room to see what their children have made, and encourage students to explain the activity to their grown-ups.

- Librarians may produce a very simple handout with the following prompt:
    - *Now that you've solved a problem for the Curious Kids with gumdrops and toothpicks, what other candy creations can you make? For example, try making structures out of marshmallows and spaghetti and test their load capacity. Challenge your grown-up. Can they make a stronger structure than you?*
    - *You may also want to submit your picture to submissions@curiositycreek.com to be featured on the CuriosityCreek website!*
- Librarians should include the date and registration information for future programs

Part 3: Additional Program Resources

Chapter 13: Resources

There are numerous digital resources available to you accompanying the 24 session plans. Each session plan lists resources available online to accompany procedural items as well as extension activities. In addition to this, each session also provides book suggestions to enhance the lesson. You should incorporate at least one book per session (please note: some sessions utilize the same text). We include the book list here in Chapter 13, as well as a full recommended book list if you are interested in ordering any of the texts not specifically noted in a session plan. However, while these texts are ones recommended in the session plans, all sessions can be modified to meet the needs and/or resources of your library. You will find both book lists below.

Provided in your session plans are also images associated with each lesson. You can access PDF versions of these images at the Innovation Destination website (https://theinnovationdestination.net/home) in the searchable database of session plans. These images can be printed as coloring pages and/or visual aids for your participants. You will also find the small map/passport for kids, the large poster-size Curiosity Creek Map, as well as all other visual aids available to you at the same site on the bottom of the Making Literacy-Innovation Connections – RUNNING the Program page. We hope these resources are beneficial to you and can assist in successfully implementing this program into your own library.

We encourage you to visit the Young Innovators official site, *The Innovation Destination* at https://theinnovationdestination.net. The Innovation Destination is a one-stop site that contains a wealth of exciting, unique and free resources for use by budding young innovators and the adults who guide, support and motivate them. It is founded in-part by a National Leadership Grant from the Institute of Museum & Library Services and includes a vast number of resources specifically designed to support libraries of all kinds. At this site you will find all the following:

- A searchable database of 500+ video segments from interviews with successful young innovators.
- A self-paced, independent training program for effective mentoring of young innovators.
- A variety of educator-created, STEM-based, and inquiry-focused lessons plans and independent learning activities.
- A monthly blog covering a wide range of topics, written by a variety of experts in the areas of STEM-based innovation and youth.
- The Young Innovators "Wall of Fame," linked to videos, brief bios, and other information about past and current young innovators.
- A database of innovation-related resources, searchable by level, keyword, and format.

The Inventor Mentor Series

Another resource that has been developed for the Literacy-Innovation Connections project is a series of 12 spark videos (2 – 5 minutes each) called "The Inventor Mentors." Spark videos are designed to spark discussion on invention related topics. They can be used in place of (occasionally) or in addition to the read-alouds, or as extensions. The Inventor Mentor series features some inventors in the K-3 age group which make the series highly relevant to this project. A list of each video topic is included in the table below.

#	Topics/Titles of Inventor Mentor Videos
1	Doing Research at the Start of the Invention Process
2	Failure (or Have You Ever Thought Failure Could Be A Good Thing?)
3	Finding Encouragement During the Invention Process
4	Inspiration from Famous Inventors
5	Getting Invention Ideas
6	Why Invent?
7	Getting in the Zone
8	Inspiration from Everyday Personal Heroes
9	Qualities of a Good Invention Team Member
10	Why Work as a Team
11	What Does Failure Really Mean?
12	Advice from the Inventor Mentors

You may also choose to visit the Curiosity Creek site at curisoitycreek.com to find more information about resources specific to the Curious Kids and other characters! See below for book lists.

Suggested Book List by Program Session Number and Title

Session	Session Title	Text	Type
1	The Curious Kids Code	*How to Code a Sandcastle* by Josh Funk	Literary/fictional
2	The Curious Kids & Circuits	*Oscar and the Bird* by Geoff Waring	Literary/fictional
3	Bubble Boredom Begone	*How to Make Bubbles* by Erika L. Shores	Informational/NF
4	Tiny Creature Creators	*The Big Book of Giant Animals, The Little Book of Tiny Animals* by Christina Banfi & Cristina Peraboni	Informational/NF
5	Bionic Beaks	*Papa's Mechanical Fish* by Candace Fleming	Literary/fictional
6 repeat	Hector's Mechanical Animals	*Papa's Mechanical Fish* by Candace Fleming	Literary/fictional
7	Fly Me To The Moon	*A Computer Called Katherine: How Katherine Johnson Helped Put America On the Moon* by Suzanne Slade	Informational - Biography
8	1 Thing, 2 Things, Nature Things, Tree Rings	*The Tree Book for Kids and Their Grown-Ups* by Gina Ingoglia	Informational/NF
9	Walk Like an Egyptian	*You Wouldn't Want to be a Pyramid Builder!: A Hazardous Job You'd Rather Not Have* by Jaqueline Morley	Informational/NF
10	Cloudy with a Chance of Fun!	*The Cloud Book* by Tomie de Paola	Informational/NF
11	Cranes That Lift, Not Fly	*What Can a Crane Pick Up?* by Rebbca Kai Dotlich	Literary/fictional
12	Birdfeeder Builders	*Those Darn Squirrels!* by Adam Rubin	Literary – fiction

13	Ear Engineers	*What If You Had Animal Ears!?* by Sandra Markle	Informational - NF
14	The Curious Kids Create Catapults	*Scampers Thinks Like A Scientist* by Mike Allegra	Literary - fiction
15	Duct Tape Technicians	*Rhoda's Rock Hunt* by Molly Beth Griffin	Literary – fiction
16	Bucket of Junk	*Have Fun Molly Lou Melon* by Patty Lovell	Literary - fiction
17	Who Are You? Fingerprinting	*Forensics in the Real World* by L.E. Carmichael	Informational - NF
18 repeat	Story-telling with Scratch	*How to Code a Sandcastle* by Josh Funk	Literary - fiction
19	Six Apples Up on Top	*The World is Not a Rectangle: A Portrait of Zaha Hadid* by Jeanette Winter	Informational - Biography
20	The Curious Cuisine Cart	*Spaghetti on a Hot Dog Bun: Having the Courage to Be Who You Are* by Maria Dismondy	Literary - fiction
21	The Science Fair Disaster	*Oh No! (Or How My Science Project Destroyed the World)* by Mac Barnett	Literary - fiction
22	The Curious Kids Invent	*The Girl Who Thought in Pictures: The Story of Dr. Temple Grandin* by Julia Finley Mosca	Informational - Biography
22 2nd book	The Curious Kids Invent	*Uniquely Wired: A Story About Autism and Its Gifts* by Julia Cook	Literary - fiction
23	Penny Boat Challenge	*The Gingerbread Boy* by Paul Galdone	Literary - fiction
24	Curious Kids Build Candy Bridges	*Iggy Peck, Architect* by Andrea Beaty	Literary - fiction

Recommended Book List

Provided/Core List Books are indicated in bold

Title	Author	Tie-in to session	Literary or Informational?
11 Experiments That Failed	Offill, Jenny	*Multiple Sessions*	Literary
A Computer Called Katherine: How Katherine Johnson Helped Put America on the Moon	**Slade, Suzanne**	**Fly Me to the Moon & Curious Kids Invent (optional for CKI)**	**Informational - Biography**
Ada Byron Lovelace and the Thinking Machine	Wallmark, Laurie	*Multiple Sessions*	Informational - Biography
Ada Lovelace, Poet of Science: The First Computer Programmer	Stanley, Diane	Fly Me to the Moon	Informational - Biography
Ada Twist, Scientist	Beaty, Andrea	*Multiple Sessions*	Literary - Fiction
Amelia Who Could Fly	Dal Corso, Mara	*Multiple Sessions*	Literary - Fiction
Are We There Yet?	Santat, Dan	*Multiple Sessions*	Literary - Fiction
Beauty and the Beak: How Science, Technology, and a 3-D Printed Beak Rescued a Bald Eagle	Rose, Deborah Lee & Veltkamp, Jane	Bionic Beaks	Informational - NF
Bubbles	Chase, Kit	Curious Kids Create Bubbles	Literary - Fiction
Birdfeeders (Kids Can Do It)	Schwarz, Renee	Birdfeeder Builders	Informational - NF
Break the Siege: Make Your Own Catapults	Ives, Rob	Curious Kids Create Catapults	Informational - NF
Building Bridges	Enz, Tammy	Curious Kids Build Candy Bridges	Informational - NF

Calling All Minds	Grandin, Temple	*Multiple Sessions*	Informational - NF
Coppernickel The Invention	Van Reek, Wouter	*Multiple Sessions*	Literary – Fiction
Crack the Code! Activities, Games, and Puzzles That Reveal the World of Coding	Hutt, Sarah and Vaughn, Brenna	*Multiple Sessions*	Informational - NF
Electricity	Olien, Rebecca	Curious Kids & Circuits	Informational - NF
Farmer Cap	Kalz, Jill	agriculture (it's funny)	Literary - Fiction
Going Places	Reynolds, Peter and Paul	*Multiple Sessions*	Literary - Fiction
Have Fun, Molly Lou Melon	**Lovell, Patty**	**Bucket of Junk**	**Literary - Fiction**
Hello, My Name is Octicorn	Diller, Kevin & Lowe, Justin	Tiny Creature Creators	Literary - Fiction
How to Bicycle to the Moon to Plant Sunflowers	Gerstein, Mordicai	Fly Me To The Moon	Literary - Fiction
How to Code a Sandcastle	**Funk, Josh**	**Curious Kids Code & Storytelling with Scratch**	**Literary - Fiction**
How to Make Bubbles	**Shores. Erika L.**	**Curious Kids Create Bubbles**	**Informational - NF**
How to Make Stuff With Duct Tape	Bell, Samantha (Illustrated by Kelsey Oseid)	Duct Tape Technicians	Informational - NF
If I Built a Car	Van Dusen, Chris	*Multiple Sessions*	Literary - Fiction

Iggy Peck, Architect	**Beaty, Andrea**	**Curious Kids Build Candy Bridges**	**Literary - Fiction**
It Looked Like Spilt Milk	Shaw, Charles G.	Cloudy with a Chance of FUN!	Literary - Fiction
Kid Scientists - True Tales of Childhood from Science Superstars	Stabler, David	*Multiple Sessions*	Informational - Biography
Love is in the Air	Jonathan Fenske	Cloudy with a Chance of FUN!	Literary - Fiction
Mechanimals	Tougas, Chris	Hector's Mechanical Animals	Literary - Fiction
Meet Einstein	Kleiner, Mariela	Curious Kids & Circuits	Literary - Fiction
Mitchell Goes Driving	Durand, hallie	*Multiple Sessions*	Literary - Fiction
Monkey with a Toolbelt	Monroe, Chris	*Multiple Sessions*	Literary - Fiction
Monkey with a Toolbelt and the Noisy Problem	Monroe, Chris	*Multiple Sessions*	Literary - Fiction
My Journey to the Stars	Kelly, Scott	Fly Me to the Moon	Informational - Biography
Not A Box	Portis, Antoinette	*Multiple Sessions*	Literary - Fiction
Oh No! (Or How My Science Project Destroyed the World)	**Barnett, Mac**	**The Science Fair Disaster**	**Literary - Fiction**
Oscar and the Bird	**Waring, Geoff**	**Curious Kids & Circuits**	**Literary - Fiction**
Papa's Mechanical Fish	**Fleming, Candace**	**Hector's Mechanical Animals & Bionic Beaks**	**Literary - Fiction**

Rhoda's Rock Hunt	**Griffin, Molly Beth**	**Duct Tape Technicians**	**Literary - Fiction**
Rosie Revere, Engineer	Beaty, Andrea	*Multiple Sessions*	Literary - Fiction
Sarabella's Thinking Cap	Schacher, Judy	*Multiple Session*	Literary - Fiction
Scampers Thinks Like A Scientist	**Allegra, Mike**	**Curious Kids Create Catapults**	**Literary - Fiction**
Star Stuff, Carl Sagan and the Mysteries of the Cosmos	Sisson, Stephanie Roth	Fly Me To The Moon	Informational - NF
Ten Apples Up On Top	LeSieg, Theo	Six Apples Up on Top	Literary - Fiction
The Big Book of Giant Animals, The Little Book of Tiny Animals	**Banfi, Christina & Peraboni, Cristina**	**Tiny Creature Creators**	**Informational - Non-Fiction**
The Cloud Book	**Tomie de Paola**	**Cloudy with a Chance of FUN!**	Informational - NF
The Girl Who Thought in Pictures: The Story of Dr. Temple Grandin	**Finley Mosca, Julia**	**Curious Kids Invent**	**Informational - Biography**
The Listening Walk	Showers, Paul (Illustrated by Aliki)	Ear Engineers	Literary - Fiction
The World is Not a Rectangle: A Portrait of Zaha Hadid	**Winter, Jeanette**	**Six Apples Up on Top**	**Informational - Biography**
Those Darn Squirrels!	**Rubin, Adam (Illustrated by Daniel Salmieri)**	**Birdfeeder Builders**	**Literary - Fiction**
Uniquely Wired: A Story About Autism and Its Gifts	**Cook, Julia**	**Curious Kids Invent**	**Literary - Fiction**

Violet the Pilot	Breer, Steve	Bucket of Junk	Literary - Fiction
What Do You Do with an Idea?	Yamada, Kobi	*Multiple Sessions*	Literary - Fiction
What Do You Do with an Problem?	Yamada, Kobi	*Multiple Sessions*	Literary - Fiction
What is a Circuit?	Weingarten, Ethan	Curious Kids & Circuits	Informational - NF
What is Computer Coding?	Pratt, Mark K	Storytelling with Scratch	Informational - NF
Young Frank Architect	Viva, Frank	*Multiple Sessions*	Literary - Fiction
Mother Bruce	Higgins, Ryan	Biology adaptations	Literary - Fiction
Hotel Bruce	Higgins, Ryan	Biology adaptations	Literary - Fiction
Bruce's Big Move	Higgins, Ryan	Biology adaptations	Literary - Fiction
What If You Had Animal Ears!?	**Markle, Sandra**	**Ear Engineers**	**Informational - NF**
What If You Had Animal Feet!?	Markle, Sandra	Ear Engineers	Informational - NF
What If You Had Animal Teeth!?	Markle, Sandra	Ear Engineers	Informational – NF
What If You Had an Animal Nose!?	Markle, Sandra	Ear Engineers	Informational – NF
Spaghetti on a Hot Dog Bun: Having the Courage to Be Who You Are	**Spaghetti on a Hot Dog Bun: Having the Courage to Be Who You Are**	**Curious Cuisine Cart**	**Literary – Fiction**
You wouldn't want to be a pyramid builder!: A Hazardous Job You'd rather not have	**Morley, Jaqueline**	**Walk Like an Egyptain**	**Informational – NF**
Mummies in the	Osborne, Mary	Walk Like an	Literary –

Morning	Pope	Egyptain	Fiction
Mummies and Pyramids: Non-Fiction Companion to Mummies in the Morning	Osborne, Mary Pope	Walk Like an Egyptian	Informational – NF
The tree book for kids and their grown-ups	**Ingoglia, Gina**	**1 thing, 2 things, nature things, tree rings**	**Informational – NF**
Trees, Leaves, & Bark	Burns, Diane	1 thing, 2 things, nature things, tree rings	Informational – NF
A Tree is a Plant	Bulla, Clyde Robert	1 thing, 2 things, nature things, tree rings	Informational – NF
Stuck	Jeffers, Oliver	1 thing, 2 things, nature things, tree rings	Literary – Fiction
Maple	Nichols, Lori	1 thing, 2 things, nature things, tree rings	Literary – Fiction
If You Hold a Seed	MacKay, Elly	1 thing, 2 things, nature things, tree rings	Literary – Fiction
The Giving Tree	Silverstein, Shel	1 thing, 2 things, nature things, tree rings	Literary – Fiction
Fingerprinting	Boy Scouts of America	Who Are You? Fingerprinting	Informational – NF
Forensics in the Real World	**Carmichael, L.E.**	**Who Are You? Fingerprinting**	**Informational – NF**

What Floats in a Moat?	Berry, Lynne	Penny Boat	Informational – NF
Boats, Ships, Submarines, and Other Floating Machines	Graham, Ian	Penny Boat	Informational – NF
Let's Try It Out in the Water	Simon, Seymour	Penny Boat	Informational – NF
One Proud Penny	Siegel, Randy	Penny Boat	Literary – Fiction
The Gingerbread Boy	**Galdone, Paul**	**Penny Boat**	**Literary – Fiction**
The Gingerbread Boy	Alperin, Mara	Penny Boat	Literary – Fiction
The Gingerbread Boy	Scarry, Richard	Penny Boat	Literary – Fiction
The Gingerbread Boy	Aylesworth, Jim	Penny Boat	Literary – Fiction
Little Excavator	Dewdney, Anna	Cranes That Lift Not Fly	Literary – Fiction
The Diggers are Coming	Steggall, Susan	Cranes That Lift Not Fly	Literary – Fiction
What Can a Crane Pick Up?	**Dotlich, Rebbeca Kai**	**Cranes That Lift Not Fly**	**Literary – Fiction**
Tip Tip Dig Dig	Garcia, Emma	Cranes That Lift Not Fly	Literary – Fiction
Cranes	Tourville, Amanda Doering	Cranes That Lift Not Fly	Informational – NF
Cranes	Lennie, Charles	Cranes That Lift Not Fly	Informational – NF
Diggers & Cranes	Granowsky, Alvin	Cranes That Lift Not Fly	Informational – NF
Cloud Dance	Locker, Thomas	Cloudy with a Chance of FUN!	Informational – NF

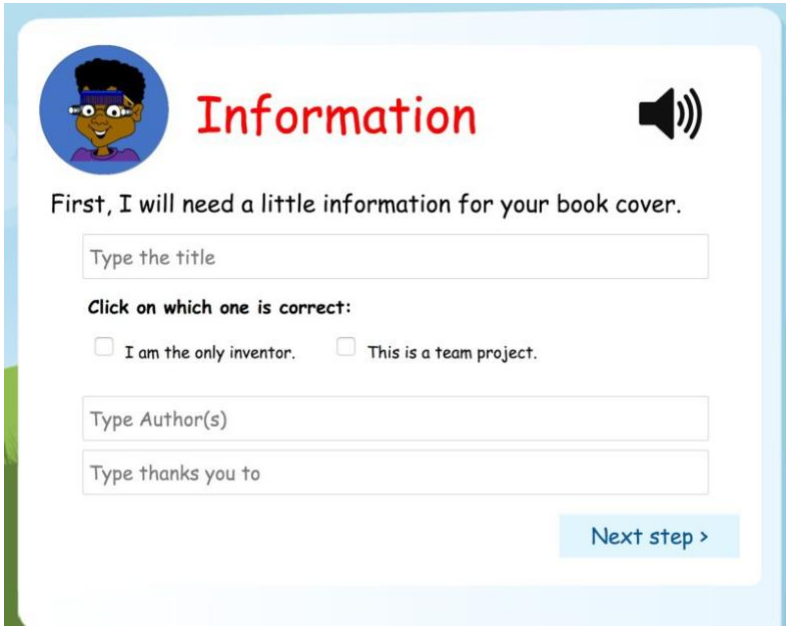
Little Cloud	Carle, Eric	Cloudy with a Chance of FUN!	Literary – Fiction
What Do You See in a Cloud?	Fowler, Allan	Cloudy with a Chance of FUN!	Informational – NF
What Makes the Sky Blue?	Slingerland, Janet	Cloudy with a Chance of FUN!	Informational – NF
Clouds	Bauer, Marion Dane	Cloudy with a Chance of FUN!	Informational – NF
Clouds	Rockwell, Anne	Cloudy with a Chance of FUN!	Informational – NF
Where in the World Can I…Touch a Cloud?	Brennan, Shawn	Cloudy with a Chance of FUN!	Informational – NF
How the Sphinx Got to the Museum	Hartland, Jesse	Walk Like an Egyptian	Informational – NF
Bill and Pete Go Down the Nile	dePaola, Tomie	Walk Like an Egyptian	Informational – NF
Fingerprints, Bite Marks, Ear Prints: Human Signposts	Libal, Angela	Who Are You? Fingerprinting	Informational – NF
Fingerprint Animals	Nuytten, Bobbie	Who Are You? Fingerprinting	Informational – NF
Fingerprint Bugs	Nuytten, Bobbie	Who Are You? Fingerprinting	Informational – NF
Fingerprint Vehicles	Nuytten, Bobbie	Who Are You? Fingerprinting	Informational – NF

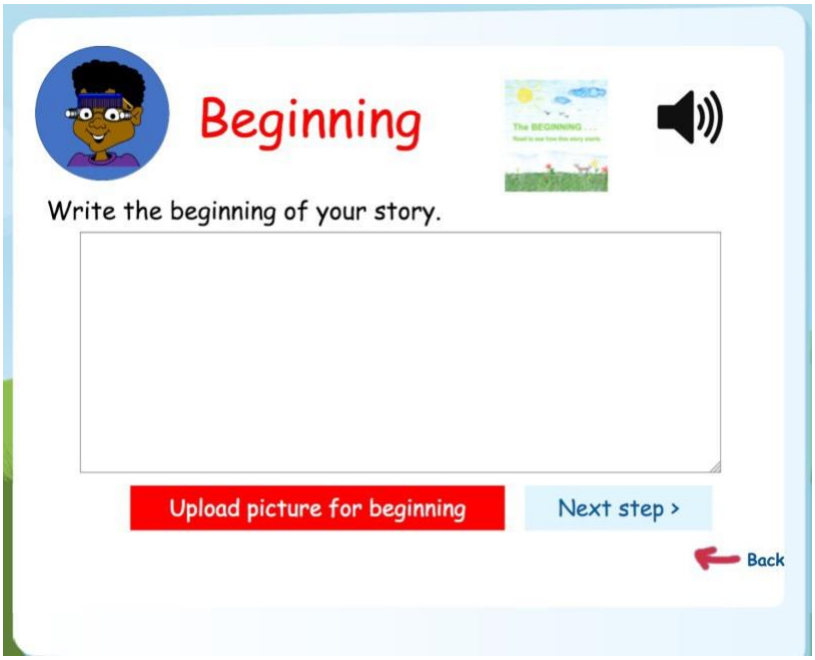
Forever Fingerprints: An Amazing Discovery for Adopted Children	Eldridge, Sherrie	Who Are You? Fingerprinting	Literary – Fiction
Hidden World: Forest	Walden, Libby	Hector's Mechanical Animals	Informational – NF
Hidden World: Animals	Walden, Libby	Hector's Mechanical Animals	Informational – NF
How to Be a Math Genius: Your Brilliant Brain and How to Train It	Goldsmith, Mike	Curious Kids Invent	Informational – NF
I Am Enough	Byers, Grace	Curious Kids Invent	Literary – Fiction
Hidden Figures: The True Story of Four Black Women and the Space Race	Shetterly, Margot Lee & Conkling, Winifred	Fly Me to the Moon	Informational – NF

Chapter 14: Hector's Invention Storybook App

One final resource developed for the project is Hector's Invention Storybook app which is located under the "Create" menu on Curiosity Creek (curiositycreek.com). This app gives children the opportunity to create their own electronic book about their invention or invention idea. It is a guided storytelling app in that Hector explains to children what to do and the app leads children through inputting the beginning, middle, and ending of their story. It also allows them to upload a picture to represent the three sections of their story. When they are finished inputting their information, they click a button and the app creates their storybook for them. They are given a code with only four numbers to write down and using that code they can call up their story at any time to show friends and relatives. Only their first name is used as the "author" of the story and no personally identifying information is collected about them protecting their privacy.

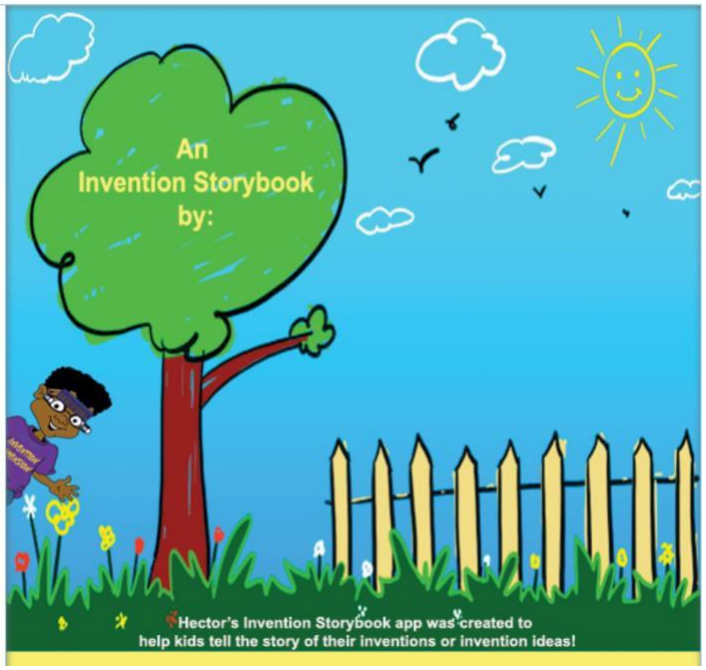
One way of using this app was suggested by Kat Clowers, Director of the Craven-Pamlico Regional Library who served on the *Literacy-Innovation Connections* Project Advisory Committee. She recommended having a computer set-up and decorated to encourage children to create their own invention stories. Children often come to the library on days other than those for the program in which they are enrolled and this will encourage children to further hone their literacy skills through writing and using a simplified story structure (beginning, middle, ending) to present their story. They can also draw their own pictures, take a photo of them, and upload them to accompany the three sections of their story. Below are two examples of the simple input screens children can use to write their stories. The audio icon indicates that Hector will explain the process to them if they click it.





When they are done with their story, they simply click the final input page to create their story and the book cover will appear with their name as author, the title of their story over the sky background, and a thank you credit beneath in smaller print.

Children can always access their own stories to share with parents and friends. However, their stories will not be searchable. If a librarian or child wishes to have their story made searchable on the Curiosity Creek site or featured on the site in some way, please contact the project director via email and provide the access code given for the story. We are happy to share the stories of our young inventors!



Chapter 15: Conclusion

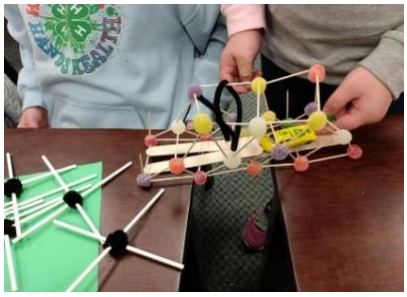
Including Lessons Learned from Piloting the Project in Ten Libraries

This PDF book has provided the background, approach, session plans, and additional resources for libraries to offer the "Inspiring Invention Through Stories" program to their patrons. We hope it has been helpful.

We know each library and community is unique and will make adaptations to make the program work best for them. We learned this from the librarians who served as our program facilitators during the piloting of the project. Each completed a brief session assessment weekly during the program to share insights. Many made necessary adaptations for their own library situation. They also shared insights and pictures on an informal closed Facebook Group during the project. It served as a kind of community of practice for libraries participating in the program, program designers, and project directors.

Lessons Learned through Piloting a Program in the Middle of a Pandemic

This project began before the pandemic was unleashed on our nation and the world, just as participating librarians prepared to deliver the project program, as designed, in a library-centered, face-to-face fashion. Pre-COVID-19, things went well. The story component of the program was strong and was effective in connecting children to the problem-scenarios and the STEM activities in service of solutions. Through our private FaceBook group, participating librarians thousands of miles apart shared, for example, the novel ways in which their young patrons built bridges to solve one of the problem scenarios posed in the library session. The libraries who participated in our first pilot were all able to complete the program. Pilot #1 went well but we learned things, too, and benefited from the librarian's suggestions and insights. We made some modifications and improvements before going into our second program pilot. But then, the pandemic hit.



Through continuous formative feedback, we learned how some libraries were able to begin the program in the early days. Then, a sign of what was to come . . . One NYS

librarian was proud of how she had set up her area for the sessions and laid out the map, related books, character cards, and posters. Her set-up was welcoming and colorful. It was March 2020. It was time. No young children came. How disappointing!

Libraries, in general, struggled to stay open to the public. Some opened for a couple of weeks and then shut down again. The lesson we learned as a project team was the same one our library partners were learning . . .

Flexibility is key!

The project team worked closely with librarians to determine their needs at this challenging time. We tried to make additional resources available if libraries decided to do the program as outreach and we worked to create materials for remote program delivery, as well. One of the key components of the program is the story element but reading copyrighted materials **online** can be problematic. While we were able to have our second group of libraries start and finish the program after a long hiatus, we realized we still needed to tackle that issue. We have since begun developing eBooks based on the problem scenarios posed in the program sessions. These eBooks have a Creative Commons license and are freely accessible to any librarian to read online if it becomes necessary to pivot to virtual delivery for any reason now or in the future. No worries about copyright. Ten eBooks have been written for this project and two are fully produced. We are sharing one of titles below and hope you enjoy (image is linked). Please feel free to email us if you have any questions about starting the program at your library! We'd love to help.