

Creating a Digital Story-Game on Inventing for Young Children: Strategies, Challenges and Best Practice

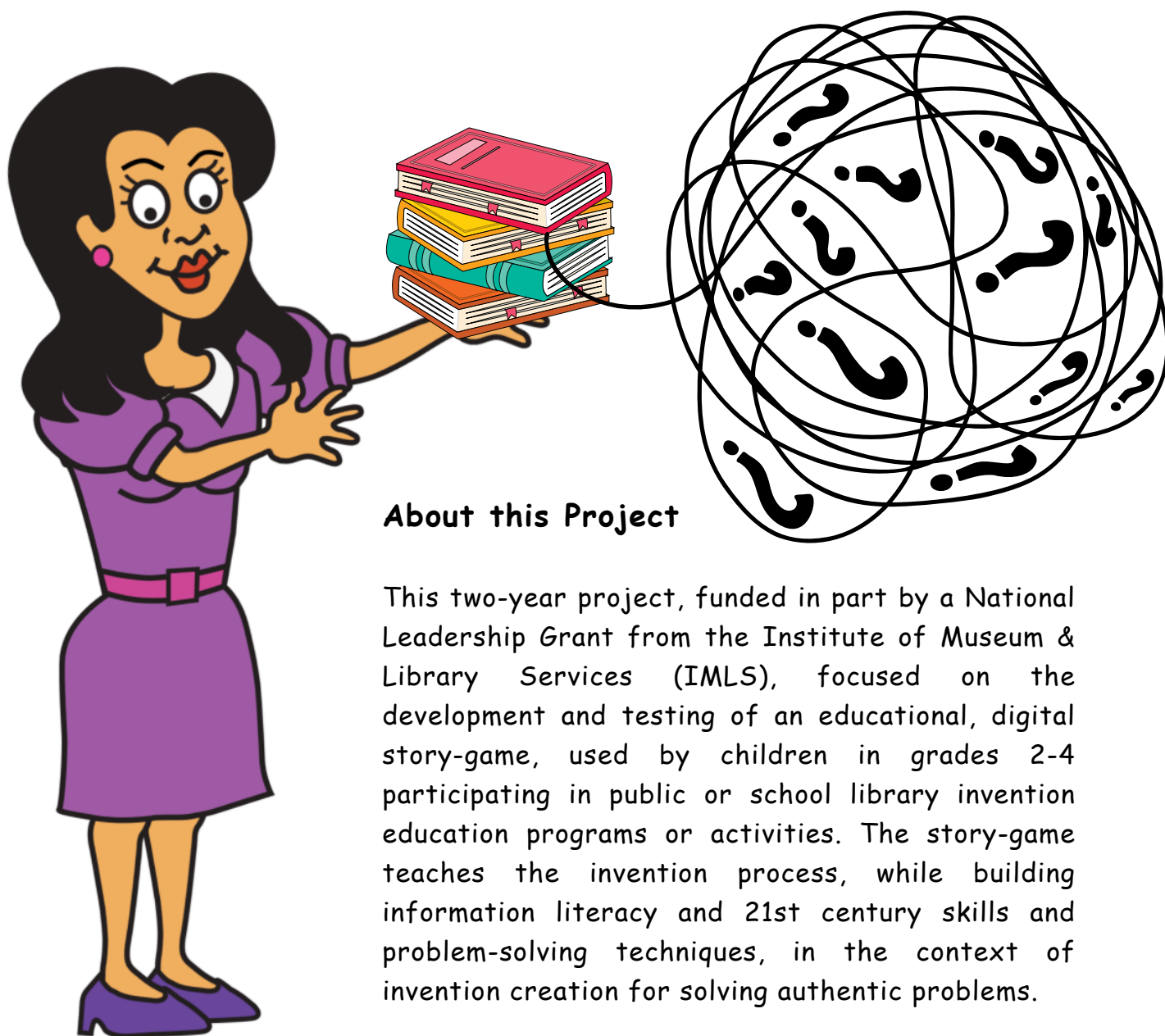


A Guide for Librarians

Creating a Digital Story-Game on Inventing for Young Children: Strategies, Challenges and Best Practice

A Guide for Librarians

This guide describes the evolution of this project and some of the insights and lessons learned from the librarians who participated in it. We hope that the information will be useful to librarians, teachers and others who might wish to replicate this project, the development of a digital story game on the invention process.



About this Project

This two-year project, funded in part by a National Leadership Grant from the Institute of Museum & Library Services (IMLS), focused on the development and testing of an educational, digital story-game, used by children in grades 2-4 participating in public or school library invention education programs or activities. The story-game teaches the invention process, while building information literacy and 21st century skills and problem-solving techniques, in the context of invention creation for solving authentic problems.

Project Goal

The project's goal was to document the design, development, use and testing of a story-game consisting of a digital story, presented in book format, with each chapter called an "adventure." Each adventure focused on a step in the invention process (National Invention Convention) in the story about a group of children, members of the Curious Kids Club, living in the small rural town of Curiosity Creek, who encounter an environmental problem in their community and seek to find an inventive solution. Each adventure contains a storyline with digital games that, when completed successfully, allow the player to move to the next adventure, focused on the next step in the invention process with critical feedback loops to previous steps, when needed.

As the project team completed a draft form of an adventure, the perspectives of the project's librarian and children's design teams, facilitated by project team researchers, were shared with the project team, including ideas, recommendations and feedback on the story-game's storyline, game elements and various other features. All aspects of this project were conducted virtually.

Project Outcomes

This project added to knowledge on the topic of games and their educational value by bringing together both invention skills and library skills and involving both librarians and children in the design of the game, further providing educational opportunities for both audiences. Results have contributed to an understanding of collaborative educational game design with and for libraries, the importance of information literacy skills throughout the invention process, and the value of incorporating digital story-games into invention education programs and activities.

The project deliverables are available on our project website, "**The Innovation Destination**" (<https://theinnovationdestination.net>).

They include:

- A six-adventure digital story-game,
- A companion journal to the story-game,
- A best practice guide for librarians who sponsor children's library programs on inventing,
- A printable glossary for the story-game, and
- An annotated bibliography of resources for librarians who provide invention education programs and activities in their libraries for children with disabilities

Get SET," a digital source evaluation tool to help children evaluate the quality of information resources they use during the invention process, developed by the project team and funded by The Lemelson Foundation, is also available on our website. The invention process requires the inventor to use a wide variety of information resource---human, print and digital---as the proceed. We recommend the use of "Get SET!" by children involved in inventing programs to learn to evaluate the quality of the information and the information resources they depend on to help them throughout the invention process.



About this Guide

This purpose of this guide is to document the processes we followed to create the various project resources for those who might be interested in creating their own analog or digital story-game and to share some of the challenges and strategies used by librarians, teachers and others involved (or would like to be) in invention

education programs and activities. This guide also provides useful information for those wishing to replicate or create and implement a digital or analog story-game that teaches the invention process. It provides examples of situations involving the 25 diverse librarians and young children who served as design team partners on this project and demonstrates ways of incorporating opportunities for player interactivity that contribute to successfully creating an inventive solution to an authentic problem.

We offer examples of suggestions for (1) improving the story-game creation process from design team reviews and (2) implementation strategies for the story-game after testing it with young children in school and public libraries throughout the U.S., made by our project's Librarians Design Team (LDT). Members of the LDT reviewed each story-game adventure, developed unit or program plans for young patrons in their libraries and then tested, evaluated and revised their plans. They also share with their colleagues, some potentially useful lessons learned from their experiences with this project. We share some of examples from their best practice accounts and other types of feedback. In addition, individual LDT librarians, with expertise in such areas as game design, patrons with disabilities, and artistic design for child audiences applied their special knowledge and experience to the development of various project resources.

All LDT activities, input and feedback was completed virtually. A special password-protected online space was created for the LDT to create and share their work and their comments. The two main tasks of the LDT were (1) to review the draft version of each of six adventures that contributed to the entire storyline and provide feedback about what they liked and didn't like their ideas about for improvement and (2) to create an instructional unit or program plan (based on a template the project team provided), and then implement, evaluate and revise it, based on the experience. Below is a brief description of each of those tasks and a few examples of their responses/

This project also included a 10-member, diverse Children's Design Team (CDT) from across the U.S. who provided us with our target audience's (grades 2-4) perspective on the decisions we were making as we developed the story-game and other project resources. As the LDT provided feedback on each adventure, the CDT simultaneously did the same. They commented on the characters, the settings, the storyline and the games. While their feedback and input often was similar to that of the librarians, these children had insights and opinions that were unique and

even more imaginative. While our experience with these brilliant, creative children was incredible and we highly recommend including children in the development process, this guide focuses on our collaboration with the 15 LDT librarians throughout the project development period.

Story-Game Adventure Reviews

Early in the project, the project team decided to use the familiar digital book format as the structure for our story-game, with six chapters (called "adventures") that teach each of the six steps of the invention process, based on the National Invention Convention/Lemelson Foundation's Model of the Invention Process. While the steps are sequential, there assume loops back to previous steps at various times in the process. The steps are: (1) Identifying/Understanding the Problem, (2) Imagining and Selecting an Invention Solution, (3) Designing the Invention Solution Prototype, (4) Building the Invention Solution Prototype, (5) Testing and Revising the Invention Solution Prototype and (6) Presenting the Invention Solution to Others. These six adventures comprised the story-game.



Before beginning the story-game, the player is asked to select a game avatar representative---one of the 10 child versions of famous American inventors (e.g., Tommie Edison, Albie Einstein). The purpose of this was two-fold: (1) to educate children about these inventors and their inventions and (2) to protect the online privacy and security of the player.

The setting and characters for the story-game had been developed previously for earlier projects by the current project's PI. The setting is a small U.S. rural town called "Curiosity Creek." The diverse characters in the story-game are a mix of the town's residents, including some adults (e.g., the public librarian, the mayor, a journalist, an environmental educator), the young kids who comprised "The Curious Kids Club," and an assortment of animals and fantasy creatures with magical powers, as well as the game player, who all work together to find solutions to the town's problem---the fish in the creek are getting very sick and no-one knows how or why, an authentic problem that affected the whole town.



The Kids model collaborative teamwork, the brainstorming process, positive ways to deal with failure, and many other important concepts. They soon learn that they all have strengths that contribute to helping them reach their goal to create inventions that help their community solve a problem. The storyline also introduces new vocabulary (with mouse-over access to that word from our glossary) and the importance of using high quality information throughout the invention process.

As our project team completed the script, artwork, voiceovers/narrations and programming for each of the six adventures of the story-game, the LDT, was given online access to the draft version of each adventure (one per month) with space provided for their comments and questions, which were later assessed for importance and feasibility for revision by the project team. In addition to pointing out typos and grammatical errors, the more targeted comments related to the look and/or sound of specific characters, flow, appeal of the storyline and game structure, workability and appropriateness of difficulty for children in the target age group (grades 2-4). For each adventure review, the LDT was given some questions to address, while encouraging them to provide other feedback, as well. Librarians also were encouraged to suggest potential solutions related to the issues they pointed out, such as issues with a game or something in the story that seemed confusing. All recommendations were thoughtfully evaluated by the project team's scriptwriters, artists, animators, and programmers and most suggestions resulted in modifications or additions.

Most adventure review feedback focused on either the characters (e.g., behaviors, visual images) or game elements (e.g., speed, ease of use, difficulty level). Here are a few examples of LDT feedback.

- This example was one of almost unanimous negative reaction from the LDT when, in Adventure 2, we introduced a Curious Kids character (Chen), for whom we had used an automated voice. Librarians thought that the voice sounded monotone, robotic, unnatural, and unchild-like. That prompted the project team to revise the character's voice by re-recording Chen's lines with a real child providing the voice.



- In Adventure 3, we introduced Timmy, a Curious Kid who is on the autism spectrum. The purpose of this character was to demonstrate that children with disabilities can participate in invention activities but may approach a task differently (not better, not worse) than the other children and positive interactions among all of the kid inventors. Most of the LDT had positive comments about this; for example, one LDT stated, "Timmy is a great addition and represents the ASD community in a positive light" while another said, "I really liked the way Timmy advocated for himself " and still another mentioned, "I think this is wonderful that Timmy is included in this game and I wish it was done more often. This will be beneficial to all students and I believe many of my kids will connect with Timmy." Another commented, "I enjoyed how his character was portrayed and think everyone did a good job of explaining why he chose certain ways to work and what he was interested in, including his process." However, some commented that Timmy's affect in the visuals of him showed too much emotion, which was atypical. We consulted with our autism expert on the LDT and she agreed that a child with autism does not typically exhibit big smiles and open emotions. Our artist changed Timmy's facial expressions and scripts were modified to reflect a more placid, unemotional affect for Timmy.



- With Adventure 4, an LDT member stated "I think that the feedback game did a really good job of addressing the importance of seeking feedback on the efficacy of their invention prototypes. I did notice that the way to answer the questions... has a pattern with each of the three prototypes. Because it was a little long of an adventure, I could see the students getting anxious to finish and just clicking the same (choices) over and over and ending up getting it right. My suggestion would be to mix up the answers a bit. So far this was my favorite adventure to complete!" Based on this and several similar comments, we made sure the three prototype answers were varied in the order of their patterns.

Instructional Unit Plans

The LDT librarians were asked to create an instructional unit or program plan, using a provided template (see Appendix), to develop a new or revised, multi-lesson or session program or instructional unit that incorporates the full story-game and leads participants through the invention creation process in which they, like the Curious Kids, seek ways to use invention to solve an environmental problem in their school or community. The unit or program plans were implemented, evaluated and revised by the librarians who created them and submitted to the project team. All units focused on an authentic local environmental problem and took the students through the invention process along with the Curious Kids. The librarians who implemented their units reported great enthusiasm for the story-game and the opportunity to invent something that was important and useful.

These instructional plans can be found on the project website, **The Innovation Destination** (<https://theinnovationdestination.net>). Click on the Supporting Innovation tab and search our Resources Database. These unit plans mirror the theme of the story-game, an environmental problem in the community. Their titles are:

- Floating Gardens Invention Challenge
- Laissez Les Bons Temps Rouler!: Making Mardi Gras Sustainable
- Conservation Through Photovoice
- Innovation for Community Wellness
- Watering System (Irrigation)
- Small Steps, Big Impact



Reflections on Best Practice

Upon completing their units or programs, librarians were invited to reflect on the project and, using a template provided to them, wrote brief accounts of their experiences. These accounts included not only what their students had learned but also what the librarians learned from the experience.

Here are a few excerpts from the librarians' stories:

- *Basically, they (the students) were working alongside the Curious Kids as they worked through their own problem. I believe this was critical to their success overall and ultimately helped them physically test what they saw and heard which in turn checked their understanding of the content in the story-game.*

- Some of my favorite reactions regarded the avatars and inventors they are based off of. One student exclaimed, "These are all inventors? Wow, that's a lot of cool stuff!" This same student even noted multiple times that it took Thomas Edison 2,700 attempts to perfect the lightbulb. The small facts they absorbed that seemed so tiny to me were huge "AH-HA" moments for them.
- "Some of them look useful but then they are not --- just like how you never judge a book by its cover!" This student was talking about useful information vs. not relevant information.
- "Game two was the rock measuring game. This was fun. You had to make 63, it was tens, sevens, and threes. I did 5 tens, one 7 and two 3's." Students were excited to play this math game and students played it multiple times because it was challenging to find new ways to make the total. Students were genuinely excited and went back to play this game multiple times.
- I asked students "Why is failure OK?" Two students in conversation stated, "You can learn ideas from it just like Thomas Edison! It can take a long time! He messed up 2700 times!" Another responded, "I learned that you never give up because mistakes are good things, they give you opportunities for learning!"
- They really loved the sound effects, especially the burping fish! I had one student that did not want to stop playing the game even when it was time to check out (which is most students' favorite part of library class.)
- Lastly, if you think, "it's just one more thing on my plate," consider how this may impact not only you and your students, but also your community. The potential impact of this program far exceeds the confines of your library. Your students can and will make a difference.
- Overall, I think the story game is engaging. It would be easy for librarians to use as a digital stand-alone or to incorporate as part of a larger hands-on unit.
- For some students, I think seeing the characters in Curiosity Creek play out their brainstorming helped them get started. This is always the most difficult part of the invention process, is "What do I do now?" And this is where I think the addition of incorporating the digital story game was an advantage.

- There was once a librarian who tried to accomplish too much. But, as she turned the pages on the spring semester, she realized that even a small dose of place-based, invention experiences remain valuable. Her take away is... do as much of this work as possible. It is extremely rewarding to see students gain new skills, discover their agency to create solutions for a better community, and be actively engaged in alternative ways in the library.
- Given these resources, and modeling from the Curious Kids, students were able to successfully follow the design process and learn more about invention and innovation. This program fits in perfectly, as this is the basis of our entire library curriculum.
- Participating in the Library Design Team as well as seeing the adventures play out within our summer reading program has changed my professional practice a great deal.

The full versions of these reflective best practice stories may be found on the project website, **The Innovation Destination** (<https://theinnovationdestination.net>) by clicking on the Supporting Innovation tab and searching our Resources Database.

Story-Game Companion Journal

Members of our LDT and our Advisory Committee highly suggested we create a journal for story-game players, as a companion document to the story-game. That journal would serve two purposes: (1) to provide a place for the player to note invention ideas and their thoughts about each adventure and the invention process and (2) to extend the story-game in a way that is fun and relevant by building on the skills and concepts covered.

The project team issued an invitation to the project's advisory committee and the LDT to create the journal and soon one of our project advisors, a school library system administrator In New York, was collaborating with one of our LDT school librarians from Louisiana, to determine a way to approach the design and development of a journal for the child players of our digital story-game.

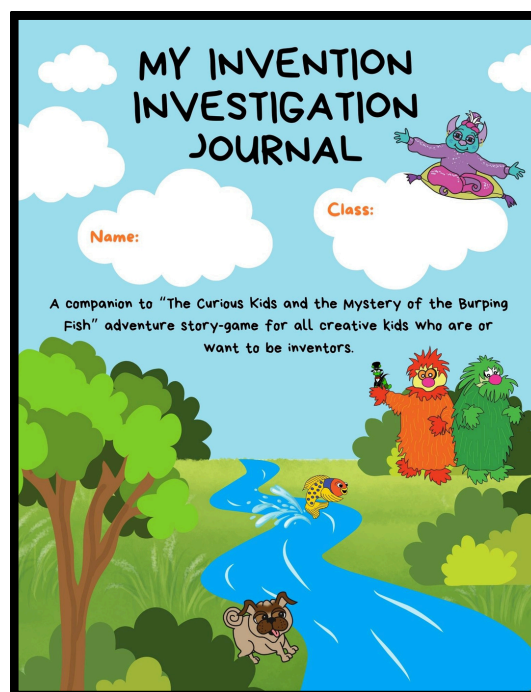
The two-person team decided to focus on the story-game's diverse set of inventor avatars, which are child representations of the child version of 10 famous and diverse American innovators, their inventions and their biographical stories. In this way, the young player can learn about famous inventors and their inventions while choosing a game avatar and for us to provide online privacy security to the player. The duo worked together for several months to develop a series of six puzzle challenges that required the child player to figure out a set of clues about one of the avatar inventors to solve a mystery puzzle for each of the six adventures.

As the journal evolved, the challenge puzzles quickly became the featured activity for each of the six adventure-related sections of the journal. In addition, each section includes a notes page where players can (1) write down their thoughts and ideas about each adventure and/or the invention process, (2) list their own ideas for an original invention, and (3) cut out and paste, into the space provided on this page, the badge they earned for successfully completing that adventure.

The final page in each section of the journal features a line drawing of a favorite character from each adventure of the story-game to be colored in as desired and surrounded by a blank background with a frame around it. The player is encouraged to use his or her imagination to draw some background scenery as well as other characters and/or items from that adventure and to color the drawing in any way they wish, using crayons, colored pencils or markers to make it his or her own unique piece of "artwork." They can also cut out the framed drawing and post it in their classroom, the library, or their home.

In the journal we advise educators to print out each section and provide it to the child players as they complete each adventure. This accomplishes two objectives: (1) avoids overloading the child player and (2) focuses the child player's attention on those activities. A final "surprise" challenge puzzle requires the player to return to the digital story-game to solve at the end of the story-game. The player is directed to click on the link provided to take them to the final puzzle. Players may then proceed to the puzzle and try to solve that challenge puzzle online with directions. Once completed, they can download and cut out a very special badge award and then return to their journals where they will find the space for pasting in that badge.

The 52-page (double-sided) journal is a printable resource that is intended to be shared in hard copy by the educator with the child players, adventure by adventure, once they have completed the corresponding adventure. The complete journal is available with other project deliverables on our project site, **"The Innovation Destination"** (<https://theinnovationdestination.net>) under the tab Supporting Innovation.



Annotated Bibliography: Libraries, Disabilities and Inventing

One of the secondary objectives of this project was to find a way to bring our Center for Digital Literacy's two main projects together (this project "The Young Innovator Project" and our other project "Project ENABLE (Expanding Non-Discriminatory Access By Librarians Everywhere) by finding a way to convey the idea of providing quality library programs on inventing to children with disabilities, thereby enhancing both projects. As a start toward accomplishing this objective, we introduced into our story-game, one of our Curious Kids (Timmy), a child on the autism spectrum and, at various times during the story-game, we demonstrated how children with autism may approach a task (e.g., inventing) differently (not better, not worse) and modeled ways for both adults and children to contribute to making that a satisfying experience for all.

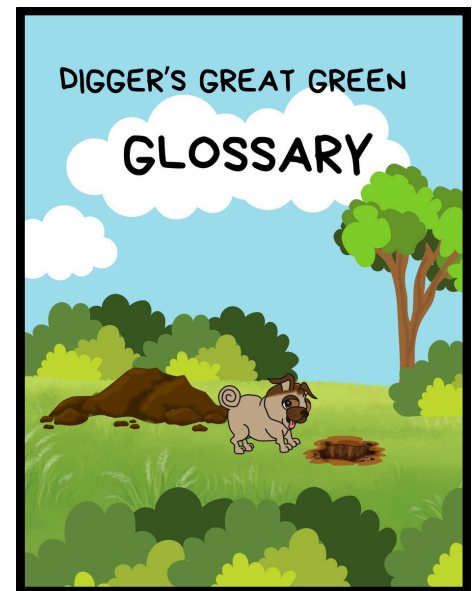
Our project team added a librarian who is an expert on autism to the LDT, asking her to serve in the role as advisor on how to portray this character in the inventing context of the story and, during the review process, focus on Timmy's behaviors and interactions, as well those of the kids and adults around him. Throughout the course of the project, she provided advice and guidance on the development of the Timmy character, including his behaviors, facial expressions and speech.



In addition, this LDT librarian developed an annotated bibliography of resources (digital and print), for both educators and children, related to invention creation programs in libraries and participants with disabilities. The annotated bibliography, entitled "Libraries, Disabilities and Inventing: A Bibliography of Resources for Creating Library Programs, Activities and Services Supporting Child Inventors with Disabilities," is included in Appendix 1 of this document and also can be found in our project's Resources Database, under The Innovation Destination website's Supporting Innovation tab.

Digital Story-Game Glossary

An additional resource for both educators and students is a story-game glossary called Digger's Great Green Glossary. It covers dozens of words used in the story-game that young children may or may not be familiar with. It is intended to be used in two ways: (1) embedded into the story-game at the exact moment the word is encountered by the player (just in time learning) so the player can learn what the word means in the context of the storyline and (2) the glossary may be accessed through the project web site's Resources Database by the educator to print out and give to students and/or incorporate it into an instructional unit or plan to teach to the students (just in case learning), prior to starting the digital story-game. Digger's Great Green Glossary can be found on the project website, **The Innovation Destination** (<http://theinnovationdestination.net>) under the Supporting Innovation tab, in the Resources Database.



We hope that this guide provides both information and guidance for using our story-game or creating one of your own.

We wish to acknowledge the 40 artists, animators, programmers, advisors, graduate students, librarians and children who enthusiastically joined us in this effort and to the Institute of Museum & Library Services and the School of Information Studies at Syracuse University for their funding and administrative support.



APPENDIX

Libraries, Disabilities and Inventing: A Bibliography of Resources for Creating Library Programs, Activities and Services Supporting Child Inventors with Disabilities

Created by Suzanne Schriar, Associate Director (ret.), Illinois State Library Member, Project's Librarian's Design Team

This annotated bibliography is intended for invention educators who wish to know more about ways to support young children with disabilities who are involved in invention education programs and activities. It includes both print and digital resources. Most resources are for educators to use in their planned instruction and programs; some resources listed are for the children themselves. Where possible, direct links to the resource are provided.

Title: *Be Different: My Adventures with Asperger's and My Advice for Fellow Aspergians, Misfits, Families and Teachers*

- Author: John Elder Robison
- Publisher: Crown
- Year of Publication: 2012
- Abstract: In his bestselling memoir, *Look Me in the Eye*, John Elder Robison described growing up with Autism Spectrum Disorder at a time when the diagnosis didn't exist. He was intelligent but socially isolated; his talents won him jobs with toy makers and rock bands but did little to endear him to authority figures and classmates, who were put off by his inclination to blurt out non sequiturs and avoid eye contact. By the time he was diagnosed at age forty, John had already developed a myriad of coping strategies that helped him achieve a seemingly normal, even highly successful, life. *Be Different* is a continuation of John Elder Robison's story. He shows how his autism, in addition to being a disability, has also been a gift that has enabled him to be a talented engineer. He offers practical advice for anyone who feels "different" on how to improve the weak communication and social skills that keep so many people from taking full advantage of their often remarkable gifts.
- Also available as an [audio book](#)
- As a supplement to the book, John Elder Robison's lecture at Google can be accessed at this link: [Be Different - John Elder Robison Talks at Google](#)

Title: *Developing Talents: Careers for Individuals with autism*

- Author: Temple Grandin, PhD and Kate Duffy
- Publisher: Future Horizons
- Year of Publication: 2024
- Abstract: Using real-life examples, Grandin and Duffy note that many of the unique characteristics of individuals on the autism spectrum lend themselves well to entrepreneurial ventures. The book explores many unnoticed aspects of vocational rehabilitation programs that provide job training and placement for people with disabilities, as well as Social Security Administration programs that offer vocational assistance. As a new edition of the 2008 book, employment figures and prospects have been updated, and new jobs have been added that are well suited for those on the spectrum.
- Also available as an [audio book](#)

Title: *Limp Forward: A Memoir of Disability, Perseverance, and Success*

- Author: Libo Cao Meyers
- Publisher: Lioncrest Publishing
- Year of Publication: 2023
- Abstract: Libo Cai Meyers shares her journey of overcoming the challenges of living with polio, being an immigrant in a new country, and the challenge of being a tech executive at Apple, in the male-dominated world of technology. *Limp Forward* is compelling in its exploration of the possibilities that unfold when we pursue our full potential.
- Also available as an [audio book](#)

Title: *The Pattern Seekers: How Autism Drives Human Invention*

- Author: Simon Baron-Cohen
- Publisher: Basic Books
- Year of Publication: 2020
- Abstract: Cambridge University Professor, Simon Baron-Cohen discusses the link between autism and ingenuity. Basically, the genes that cause autism enable pattern seeking, which is fundamental to the process of inventing.
- Also available as an [audio book](#)
- Online resources to supplement the book can be accessed at the following links:
 - [How autism drives human invention with Simon Baron-Cohen](#) - a Science and Cocktails youtube video, March 5, 2022
 - [Is there a link between autism and the capacity for invention? Laying out the evidence that shows some links](#) - Psychology Today article, reviewed by Tyler Woods, September 24, 2021

Title: *The Power of Different: the link between disorder and genius*

- Author: Gayle Saltz, M.D.
- Publisher: Flatiron Books
- Year of Publication: 2017
- Abstract: In *The Power of Different*, psychiatrist and bestselling author Gail Saltz examines the latest scientific discoveries, profiles famous geniuses who have been diagnosed with all manner of brain “problems”—including learning disabilities, ADD, anxiety, Depression, Bipolar disorder, schizophrenia, and Autism—and tells the stories of lay individuals to demonstrate how specific deficits in certain areas of the brain are directly associated with the potential for great talent. Saltz shows how the very conditions that cause people to experience difficulty at school, in social situations, at home, or at work, are inextricably bound to creative, disciplinary, artistic, empathetic, and cognitive abilities. Enlightening and inspiring, *The Power of Different* proves that the unique wiring of every brain can be a source of strength and productivity and contributes to the richness of our world.
- Also available as an [audio book](#)

Title: *Secrets of the Autistic Millionaire: Everything I know now about Autism and Asperger's that I wish I'd known then*

- Author: David William Plummer
- Publisher: Independently Published
- Year of Publication: 2021
- helped him emerge from high school dropout to successful executive and entrepreneur. He explains how powerful behaviors and tenacity exhibited by many people on the Spectrum, including Albert Einstein, Elon Musk and Steve Jobs, pushed them to achieve great success.



Books for children (ages 0-12 yrs)

Title: *Adam Baum: the autistic engineer*

- Author: LaTanya Mitchell Brooks and Luis Sanchez (illustrator)
- Publisher: NextLevel Book Publishing
- Year of Publication: 2020
- Abstract: Adam Baum: The Autistic Engineer is cleverly written and inspires children of all abilities to pursue STEM careers. Adam realizes his differences makes it difficult for him to make friends, as other kids tease him by pointing, laughing and calling him Atom Bomb. Things began to change, one day...The story is captured by vivid illustrations that engage the reader from start to finish. The book also features reading comprehension questions to reinforce the lessons in the story. (children of all ages)
- Additional resources to supplement the book can be accessed at the following links:
 - [Adam Baum: the autistic engineer](#) - ImagineTime TV Children's Books Read Aloud youtube video
 - [Science Board Game Cards Ages 9-11 / Adam Baum: The Autistic Engineer \(teacherspayteachers.com\)](#) TPT website

Title: *Autistic Legends Alphabet*

- Author: Beck Feiner
- Publisher: Alphabet Legends
- Year of Publication: 2020
- Abstract: From Dan Aykroyd to Bobby Fischer, Jodi DiPiazza to Greta Thunberg, Autism spectrum. Beautifully illustrated and movingly written, this unique Alphabet Legends title is a 'must read' for every young person on the spectrum, and their family. (ages 0-12 yrs)
- Additional resources to supplement the book can be accessed at the following links:
 - [Story Time! Autistic Legends Alphabet](#) - presented by Genevieve Goings

Title: *Calling All Minds: how to think and create like an inventor*

- Author: Temple Grandin, PhD
- Publisher: Philomel Books
- Year of Publication: 2018
- Abstract: Have you ever wondered what makes a kite fly or a boat float? Have you ever thought about why snowflakes are symmetrical, or why golf balls have dimples? Have you ever tried to make a kaleidoscope or build a pair of stilts?

(cont. on next page)

- Abstract: Have you ever wondered what makes a kite fly or a boat float? Have you ever thought about why snowflakes are symmetrical, or why golf balls have dimples? Have you ever tried to make a kaleidoscope or build a pair of stilts? In *Calling All Minds*, Temple Grandin explores the ideas behind all of those questions and more. She delves into the science behind inventions, the steps various people took to create and improve upon ideas as they evolved, and the ways in which young inventors can continue to think about and understand what it means to tinker, to fiddle, and to innovate. And laced throughout it all, Temple gives us glimpses into her own childhood tinkering, building, and inventing. More than a blueprint for how to build things, in *Calling All Minds* Temple Grandin creates a blueprint for different ways to look at the world. And more than a call to action, she gives a call to imagination, and shows readers that there is truly no single way to approach any given problem--but that an open and inquisitive mind is always key. (ages 8-12 yrs)
- Also available as an [audio book](#)
- Additional resources to supplement the book can be accessed at the following links:
 - [The World Needs all Kinds of Minds - Temple Grandin](#) TED Talk, February 24, 2010
 - [Dr. Temple Grandin - Calling all Minds](#) Amazon Prime Video, 2018

Title: *Different Like Me: my book of autism heroes*

- Author: Jennifer Elder (author and illustrator) and Marc Thomas (illustrator)
- Publisher: Jessica Kingsley Publishers
- Year of Publication: 2005
- Abstract: *Different Like Me* introduces autism children aged 8 to 12 years to famous, inspirational figures from the world of science, art, math, literature, philosophy and comedy. Eight-year-old Quinn, a young boy with Asperger's Syndrome, tells young readers about the achievements and characteristics of his autism heroes, from Albert Einstein, Dian Fossey and Wassily Kandinsky to Lewis Carroll, Benjamin Banneker and Julia Bowman Robinson, among others. All excel in different fields but are united by the fact that they often found it difficult to fit in--just like Quinn. Fully illustrated in color and written in child-friendly language, this book will be a wonderful resource for children, particularly children with autism, their parents, teachers, carers and siblings. (ages 3-12 yrs)

Title: *The Girl Who Thought in Pictures: The Story of Dr. Temple Grandin*

Author: Julia Finley Mosca (author) and Daniel Rieley (illustrator)

Publisher: Innovation Press

Year of Publication: 2019

(cont. on next page)

- Abstract: The inspiring story and children's book of how Temple Grandin used her disability to become a great innovator in animal science and engineering. Thinking in pictures connected her with animals, where she innovated the way cows are herded on farms throughout the globe. (ages 4-9 yrs)
- Additional resources to supplement the book can be accessed at the following link:
 - [The Girl Who Thought in Pictures: Teaching Activities and Resources](#) - The Children's Library Lady website
 - [BUNDLED Science & Space 4 Adapted Interactive Books {Autism, Special Education} \(teacherspayteachers.com\)](#) - This bundle includes:
 - [In Space](#) - *18 page adapted book with word bank, *12 word cards
 - [Daytime & Nighttime](#) - *17 page adapted book with word bank, *14 word cards
 - [In The Sky](#) - *23 page adapted book with "I am" questioning, picture to word match, and word bank, *12 word cards, *In The Sky emergent reader make & take book, *2 handwriting practice sheets
 - [All About Space](#) - *26 page adapted book with "I am" questioning, planet sequencing, picture to word match, and word bank, *12 word cards, *All About Space emergent reader make & take book, *2 planet handwriting practice sheets
 - A series of additional special education resources are provided at the links below:
 - [PreK special education resources | TPT \(teacherspayteachers.com\)](#)
 - [Kindergarten special education resources | TPT \(teacherspayteachers.com\)](#)
 - [1st grade special education resources | TPT \(teacherspayteachers.com\)](#)
 - [2nd grade special education resources | TPT \(teacherspayteachers.com\)](#)
 - [3rd grade special education resources | TPT \(teacherspayteachers.com\)](#)
 - [4th grade special education resources | TPT \(teacherspayteachers.com\)](#)
 - [5th grade special education resources | TPT \(teacherspayteachers.com\)](#)

Title: *Inventor Ninja: A children's book about creativity and where ideas come from*

- Author: Mary Nhin
 - Publisher: Grow Grit Press
 - Year of Publication: 2020
- (cont. on next page)



- Abstract: Inventor Ninja is a story about a ninja who is always busy creating inventions to solve all his problems until one day he loses his creativity until his friends help him to regain it with some time to relax first. This is a great story to show how even the most creative people can struggle some days. It shows children that sometimes it's important to take time out to get creative thinking back. Children are shown the value of taking a break, but not giving up. (ages 3-7 yrs)
- Also available as an [audio book](#)
- Additional resources to supplement the book can be accessed at the following links:
 - [Inventor Ninja - Lesson plans, includes SEL, STEM, writing, art, and more!](#)

Title: *The Littlest Inventor*

- Author: Mandi C. Mathis and Danielle Ragogna (illustrator)
- Publisher: Sensory World
- Year of Publication: 2016
- Abstract: The Littlest Inventor is a brilliantly colored picture book featuring a smart, sensitive boy with sensory issues. These issues make it challenging to experience something most of us have no problem with, such as a simple trip to the grocery store. However, by being self-aware, creative, and proactive, the littlest inventor succeeds in the very task he finds most difficult. He invents his own resources and tools to make the trip fun! For those with Sensory Processing Disorder (SPD), life can often be overwhelming. However, when equipped with knowledge to help ourselves and confidence to be ourselves, life becomes not just manageable, but enjoyable. (ages 6-9 yrs)

Title: *The Outdoor Scientist: the wonder of observing the natural world*

- Author: Temple Grandin, PhD
- Publisher: Philomel Books
- Year of Publication: 2021
- Abstract: In this book, Dr. Temple Grandin, an inventor and world-renowned scientist, introduces readers to geologists, astrophysicists, oceanographers, and many other scientists who unlock the wonders of the natural world. She shares her childhood experiences and observations, whether on the beach, in the woods, working with horses, or gazing up at the night sky. This book explores all areas of nature and gives readers the tools to discover even more on their own. With forty projects to give readers a deeper understanding of the world around them, from the depths of space to their own backyard, this is a perfect read for budding scientists, inventors, and creators! (ages 9-12 yrs)

Some additional books for young readers

Title: *Caterpillar Summer*

- Author: Gillian McDunn
- Date of Publication: April 2, 2019
- Publisher: Bloomsbury Children's books
- Abstract: Cat and her brother Chicken have always had a very special bond--Cat is one of the few people who can keep Chicken happy. When he has a "meltdown" she's the one who scratches his back and reads his favorite story. She's the one who knows what Chicken needs. Since their mom has had to work double-hard to keep their family afloat after their father passed away, Cat has been the glue holding her family together. But even the strongest glue sometimes struggles to hold. When a summer trip doesn't go according to plan, Cat and Chicken end up spending three weeks with grandparents they never knew. For the first time in years, Cat has the opportunity to be a kid again, and the journey she takes shows that even the most broken or strained relationships can be healed if people take the time to walk in one another's shoes.
- Write-Up: *Caterpillar Summer* is about the summer adventures of Cat "Caterpillar" and Henry "Chicken." Within the novel Henry, who prefers to be called Chicken, is on the autism spectrum. He is the younger brother to the titular Caterpillar, and one of the novel's secondary protagonists. Chicken's autism presents itself in a variety of ways. He displays literal thinking as well as a difficulty in understanding social cues and the emotions of others. Additionally, Chicken has an intense aversion to eye contact, except for when it comes to marine animals. Marine animals are one of Chicken's special interests, so he knows quite a bit about them, but especially so sharks. While wary of new people and social situations, Chicken uses his shark facts to make connections, and express himself to others. While he sometimes struggles to understand the emotions of others, Chicken also displays hyper empathy, and wants to see those around him happy, especially when he finds out they are upset. Chicken has some sensory difficulties, namely a dislike of loud noises, and the scratchy tags on his shirt. A behavior of Chicken's that is consistently brought up throughout the book is his tendency to elope, or run away from safe situations, and find small corners to hide in.

(cont. on next page)

- (cont. write-up) As the younger brother to the novel's protagonist, Chicken often acts as a motivating force in the story. His older sister Caterpillar is used to taking on the role of caretaker to Chicken, and so his actions are often used as a means of characterizing her as a strong and responsible type. Yet Chicken has a very defined personality, and his interests, feelings, and motivations are still made readily apparent to the reader. Chicken's older sister is fiercely devoted to him, and the two of them behave very amicably towards each other. Caterpillar works to keep Chicken safe and happy, and even though he often struggles to read her emotions, Chicken too has moments where he recognizes his sister's distress, and works to fight for her happiness. While initially wary of his autism, both of Chicken's grandparents also seem to have a good relationship with him. His grandmother Lily specifically delights in hearing Chicken enthuse about marine life, and is even noted as one of the few characters who can help get Chicken out of his shell. Though his autism can cause difficulties in connecting with others, Chicken is not shamed or bullied for his behaviors. Instead, the children in the novel seem to treat him with kindness, playing with him, and worrying for him in situations where he is prone to meltdowns.

Title: *Get a Grip, Vivy Cohen!*

- Author: Sarah Kapit
- Date of Publication: February 25, 2020
- Publisher: Dial Books
- Abstract: Vivy Cohen is determined. She's had enough of playing catch in the park. She's ready to pitch for a real baseball team. But Vivy's mom is worried about Vivy being the only girl on the team, and the only autistic kid. She wants Vivy to forget about pitching, but Vivy won't give up. When her social skills teacher makes her write a letter to someone, Vivy knows exactly who to choose: her hero, Major League pitcher VJ Capello. Then two amazing things happen: A coach sees Vivy's amazing knuckleball and invites her to join his team. And VJ starts writing back! Now Vivy is a full-fledged pitcher, with a catcher as a new best friend and a steady stream of advice from VJ. But when a big accident puts her back on the bench, Vivy has to fight to stay on the team.

Title: *Me and Sam Sam Handle the Apocalypse*

- Author: Susan Vaught
- Date of Publication: May 14, 2019
- Publisher: Simon & Schuster

(cont. on next page)

- Abstract: When the cops show up at Jesse's house and arrest her dad, she figures out in a hurry that he's the #1 suspect in the missing library fund money case. With the help of her (first and only) friend Springer, she rounds up suspects (leading to a nasty confrontation with three notorious school bullies) and asks a lot of questions. But she can't shake the feeling that she isn't exactly cut out for being a crime-solving hero. Jesse has a neuro-processing disorder, which means that she's "on the spectrum or whatever." As she explains it, "I get stuck on lots of stuff, like words and phrases and numbers and smells and pictures and song lines and what time stuff is supposed to happen." But when a tornado strikes her small town, Jesse is given the opportunity to show what she's really made of—and help her dad.

Title: *Leo and the Octopus*

- Author: Isabelle Marinov
- Date of Publication: January 7, 2021
- Publisher: Templar Publishing
- Abstract: The world was too bright for Leo. And too loud. "I must be living on the wrong planet," Leo thought. Leo struggles to make sense of the world. He doesn't understand the other children in his class, and they don't seem to understand him. But then one day, Leo meets Maya. Maya is an octopus, and the more Leo learns about her, the more he thinks that perhaps he isn't alone in this world, after all.

Title: *A Friend for Henry*

- Author: Jenn Bailey
- Date of Publication: February 26, 2019
- Publisher: Chronicle Books
- Abstract: In Classroom Six, second left down the hall, Henry has been on the lookout for a friend. A friend who shares. A friend who listens. Maybe even a friend who likes things to stay the same and all in order, as Henry does. But on a day full of too close and too loud, when nothing seems to go right, will Henry ever find a friend—or will a friend find him? With insight and warmth, this heartfelt story from the perspective of a boy on the autism spectrum celebrates the everyday magic of friendship.

Title: *Benji, the Bad Day, and Me*

- Author: Sally J. Pla
- Date of Publication: August 7, 2023
- Publisher: Lee & Low Books

(cont. on next page)

- Abstract: Sammy is having the absolute rottenest, worst day ever. His little brother, Benji, knows exactly what that's like. Nothing seems to be going right for Sammy today. At school, he got in trouble for kicking a fence, then the cafeteria ran out of pizza for lunch. After he walks home in the pouring rain, he finds his autistic little brother Benji is having a bad day too. On days like this, Benji has a special play-box where he goes to feel cozy and safe. Sammy doesn't have a special place, and he's convinced no one cares how he feels or even notices him. But somebody is noticing, and may just have an idea on how to help Sammy feel better.
- Additional resources to supplement the book can be accessed at the following links:
 - [Dr. Temple Grandin Virtual Event | The Outdoor Scientist](#) youtube video
 - Healthy Screen Habits Podcast: Episode 6 - Technology, Autism, and the Outdoor Scientist

Title: *Problem-Solving Ninja: a STEM book for kids about becoming a problem solver*

- Author: Mary Nhin
- Publisher: Grow Grit Press
- Year of Publication: 2021
- Abstract: Problem-Solving Ninja learns how to find solutions using a newly found tool. Find out what happens in this STEM book about developing skills to problem solve. The new social-emotional learning children's book series, Ninja Life Hacks, was developed to help children learn valuable life skills. Fun, pint-size characters in comedic books easy enough for young readers, yet witty enough for adults. The Ninja Life Hacks book series is geared to kids 4-10+. Perfect for boys, girls, early readers, primary school students, or toddlers. Excellent resource for educators, parents, and teachers. (ages 4-10+ yrs)
- Also available as an [audio book](#)

Title: *Wonderfully Wired: An introduction to the world of neurodiversity*

- Author: Louise Gooding and Ruth Burrows (illustrator)
- Publisher: DK Children
- Year of Publication: 2023
- Abstract: Our brains are unique in the way they function, work, and think. Neurodiversity is still a relatively 'new' concept that can be tricky to understand, but this book is here to help! This inspirational book written by neurodiverse author Louise Gooding challenges misconceptions and shows how neurodivergent brains work a little differently. (cont. on next page)

- (Cont. abstract) It is common for neurodiverse people and those with neurological differences to feel as though they don't fit in, but their extraordinary differences should be embraced. Wonderfully Wired Brains teaches children aged 7-9 all about the awesome abilities that neurodiverse individuals have, introduces them to advocates who are challenging neurodiversity stereotypes, and most importantly gives them a safe space to feel accepted. (ages 7-9 yrs)

Online Videos

- Doctor Mad Science - simple but awesome science experiments
- Doctor Mad Science - YouTube instructs viewers to conduct numerous simple science experiments. Hosted by a 15 year old autistic boy named Jordan, the experiments use household products because science is everywhere! Jordan has received international media attention, as he becomes a role model to young children with his passion to communicate online and share his love for science. All the videos are hosted, edited, and uploaded by Jordan.
- 5 Fun Science Experiments for Kids with Autism - YouTube

Additional Online article, blogs and websites:

- 12 Disabled Scientists Who Made the World a Better Place - By Jake Rossen, Mental Floss, October 6, 2016
- Dots Out of Line: On Neuroatypical Curiosity - Educators should ask not who is curious, but how is each person curious? By Perry Zurn and Dani S. Bassett - The MIT Press Reader
- Educating Students Who Have Different Kinds of Minds - American Academy of Arts and Sciences - Winter 2017 Bulletin
- Meet the autistic scientists redefining autism research: Growing ranks of researchers on the spectrum are overcoming barriers — from neurotypical bias to sensory sensitivities to shape autism science. By Rachel Nuwer, June 10, 2020 - Spectrum News

- *Peter Lantz: Using His Asperger's For A Career In Video Games, By Ron Sandison, June 12, 2018*
- *Learning Through Play - Play opens a world of learning as diverse as children themselves. But design of education tools, experiences and services must build on that and keep neurodivergent children in mind from the start. To make this vision reality, the LEGO Foundation has launched an accelerator program called Play For All Accelerator.*
- *Blog | Nugget And Pie, Articles about the importance of play with a focus on autism and ADHD*
- *The Unseen Threads: How Satoshi Tajiri's Autism Wove the World of Pokémon*
- *Stem3 Academy Website - Mission Statement: STEM3 (pronounced STEM Cubed Academy). First of its kind to provide curriculum based in Science, Technology, Engineering and Mathematics (STEM) to students with high-functioning autism spectrum disorder, ADHD, and other social and learning differences.*

