# My Adventure as a Scientist

## A Multidisciplinary Learning Adventure for Creative Kids

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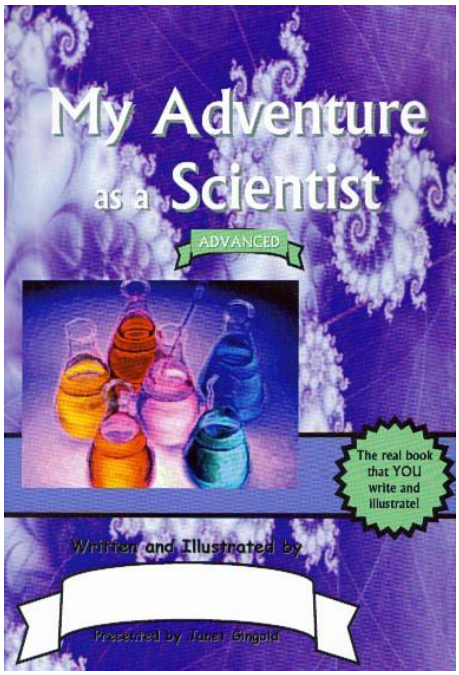
The ability to make connections is essential for all kinds of problem solving. Too often, students don't transfer what they learn from one class to the next or from the classroom to the wider world. They work hard to learn something. They show that they learned it. Then they work hard to learn something else. To help build connections, they need more tasks that require them to make links between lessons and across disciplines. They need to work hard to learn something, and then use what they have learned in a way that builds connections to other things they know or events in the real world. The Advanced My Adventure books are designed to let kids use real-world details that they've learned in science or geography or history as they envision themselves as the heroes of imaginative adventure stories.




*My Adventure as a Scientist* is an "interactive book" that can be used to enrich and integrate science and language arts lessons for grades 5 through 7. It presents the scaffold for a story in which the protagonist designs and performs an investigation using principles of scientific method, and then presents his or her findings at a science fair. The science fair judges are "Spirits of Discovery"—real and imaginary seekers of knowledge who present different perspectives on the quest for truth. The scaffold provides structure to nurture clear communication and critical thinking while allowing students freedom to add their own realistic details and illustrations as they create their own unique adventure stories. It is constructed to prompt more kids to use more of their brains—to create connections between the logical-mathematical, verbal-linguistic and visual-spatial functions.

This project works best when kids can use their previous experiences with hands-on science activities as well as language arts lessons about parts of speech, synonyms and word choice and art lessons about using line, shape and color to create meaningful images. Specific content knowledge that will contribute to student success with this project is already part of most upper elementary and middle school science curricula, including exposure to the history of science, scientific habits of mind and the scientific method. *My Adventure as a Scientist* provides a

vehicle for reinforcing, enhancing and extending the traditional curriculum by linking lessons from science, reading, writing and visual arts to create something fun. Each student's final product becomes a unique synthesis of lessons learned from multiple disciplines.

**The Independent Investigation**

Ask a question. Formulate a hypothesis. Design a test. Collect data. Analyze the data. Reach a conclusion. Ask a new question. This is the classic "science project" process that most kids have encountered by the end of fifth grade. Even if your school does not do a science fair, independent investigations give kids this age a treasure trove of opportunities for learning, from how to use the library to find books about their subject, to how to choose search terms to get meaningful results for online queries, to how to find the materials they need in their basement, kitchen or hardware store. There are lots of ideas for experiments on line and in books, but many of the best investigations start out with the child's own question. When guiding grown-ups ask "What do you think?" and "How might you test that idea?" kids can often devise their own experiments. Getting their hands on a new tool can get kids wondering "What can I discover with this?" Repeating classic experiments often yields unexpected results, raising fruitful questions about experimental design, measurement technique, and the importance of doing multiple trials.

The guiding force behind the independent investigation is a testable hypothesis. This usually takes the form of an if-then sentence. If fertilizer helps plants grow, then plants that get more fertilizer will grow better than plants that get less fertilizer. If sleep helps people remember things, then people who nap after they study will remember a lesson better than people who don't. If foam blocks the flow of heat, then water in a container wrapped in thicker foam will cool slower than water wrapped in thinner foam. Whatever the realm of inquiry, testing the hypothesis should involve an independent variable that is manipulated on purpose, a dependent variable that can be quantified by measuring, counting or scoring, and an attempt to keep all other variables constant for a "fair test."

*My Adventure as a Scientist* invites students to use their own previous investigations as a springboard for a creative adventure where it's okay to "rewrite reality" to build a better outcome. Kids who have done hands-on activities to perform experiments that they think up will have a greater bank of realistic details to draw from as they tell their stories and create their illustrations. Their "if only" regrets and "what if" wonderings can spark new thought experiments as they build their story. They are invited to exercise their emerging powers of metacognition by thinking critically about what didn't work, how they know what they know, and the possible unforeseen consequences of their discoveries.

**The History and Process of Science**

Studying the lives of scientists provides important insights into how we know what we know as well as the contributions of diverse individuals to our understanding of the way the world works. Library shelves house many biographies of scientists. Some useful titles are included in the bibliography at the end of *My Adventure as a Scientist*. The "jigsaw" technique can be used to

develop "experts" within the group who can share their findings with their peers. For example, each student can be assigned to prepare an oral presentation about a scientist, including a summary of his or her important work and some details about his or her life and personality. Details about what these people looked like or what they wore will prove useful as they create illustrations for their adventure story. Sharing the presentations provides a knowledge base among the members of the group, and then as they are working on their stories students can be encouraged to consult the "experts" when they need more details. The following table lists explorers and investigators that are mentioned in *My Adventure as a Scientist* in the order of their appearance.

| **Who** | **Why** |
|---|---|
| Neil Armstrong[1] | Exploring new frontiers |
| Lewis and Clark[1] | Exploring new frontiers |
| Charles Darwin[1] | Seeing old facts in new ways |
| Gregor Mendel[1] | Important discoveries "in his own backyard" |
| Anton van Leeuwenhoek[2] | Recording and sharing discoveries so that others can learn |
| Ben Franklin[2] | Using science to solve human problems |
| Marie Curie[2] | Better understanding yields better problem solving |
| George Washington Carver[2] | Science is for improving lives, not making money |
| Leonardo da Vinci[2] | Critical thinking leads to innovation |
| Isaac Newton[2] | Each scientist builds on the work of others |
| Nicolaus Copernicus[1] | Earth is not the center of the universe |
| Galileo Galilei[1] | New tools (telescope) give different kinds of observations |
| Johannes Kepler[1] | Planets move in predictable ways |
| Aristotle[1] | Testing of old ideas stimulates new ideas |
| Ptolemy[1] | Collecting, categorizing and analyzing data makes it useful |
| Albert Einstein[2] | Describing science through math |
| Thomas Edison[2] | Hard work is the key to success |
| Lao Tsu[2] | Know what you don't know |
| | |
| [1]Brief mention in the story | |
| [2]"Spirit of Discovery" acting as judge at the science fair | |

**Literary References**

Just as knowledge about lives of scientists enhances the meaning of the project, so too will knowledge of the origin of several literary references, namely Sir Galahad, Prometheus and Frankenstein. In Arthurian legends, Sir Galahad amazes all present by sitting in a chair that would be hazardous to any but the one who will find the Holy Grail. He then goes on to have many adventures, culminating in finding what others fail to find, succeeding because he maintained his virtue. Prometheus incurred the wrath of Zeus by stealing fire. Frankenstein's scientific work unleashed a monster. Guiding grown-ups should point out that Mary Shelley's "Frankenstein" wasn't a "real" scientist, but his story brings up important questions about the uses of science. Students might need to be told that Frankenstein was the inventor, not the monster. If these stories haven't been part of the group experience, students who have read them

can be consulted as "experts." Envisioning the scientist as a hero on a potentially dangerous journey in search of truth builds connections between the literary and scientific traditions.

**Habits of Mind**

Embedded within the structure of this story are many prompts to engage productive habits of mind as described by Costa and Kallick, including asking questions and posing problems, applying past knowledge to new situations, engaging imagination to find innovations, thinking and communicating clearly and precisely, striving for accuracy, persisting, thinking about thinking and responding with wonderment and awe. The "collaboration" between the young creator and the author of the scaffold, as well as interaction with peers throughout the process foster thinking interdependently and flexibility. Guiding grown-ups can help students recognize how they can enjoy these ways of thinking in this project and many others to come.

**Activating Multiple Pathways**

While the scientific method primarily uses logical-mathematical thinking, *My Adventure as a Scientist* creates links to engage visual-spatial and verbal-linguistic thinking as well. The "hero's journey" story line taps into literary archetypes and the blank spaces encourage self-expression and verbal explanation. Empty pages for illustration can be used for flow diagrams and graphs as well as illustrations that clarify and enrich the text. Students with special strengths and weaknesses can be grouped so that they can help each other. Kids who usually emphasize their logical-mathematical mode can get advice from their more visual-spatial peers about their illustrations and the creative story-tellers can straighten out some of their details with help from those with a more logical-mathematical bent. The story poses questions that prompt evaluating one's own thinking and feelings. Sharing ideas with others provides opportunities to practice interpersonal skills and get new views of others' perspectives. By calling on these different modes of thinking, this project activates more parts of more brains.

**Some practical tips**

Remind students that there are lots of different "right" ways to fill in the blanks. They should choose what make the best sense them for *their* story.

Encourage idea sharing. Stories can be similar in some places, but different in others.

To get better responses, ask more questions. "What would happen if…" "How would you feel if…" "What do you think?" "What else?" "What would that look like?" " What does that remind you of?" "Remember when you…? Can you use that?"

Encourage use of the thesaurus and dictionary to find more interesting and precise words and phrases.

Have students use pencils, not pens, so that they can change their minds if they get a better idea.

Colored pencils work well for illustrations on these relatively small pages.

Using practice paper to plan out illustrations or try out ideas might prevent some perfectionists' meltdowns.

When more space is needed or there's desperate need for a do-over, just cut a piece of paper to size and insert it with a few dabs from a glue stick.

Some kids this age like to reach for the outrageous for the attention it gets. Others might feel that their more concrete renderings aren't interesting. Acknowledge value in diverse approaches.

Keep it fun.

Students often enjoy sharing their finished products by reading them to each other or to younger kids.

**Invitation to teachers**

If you use *My Adventure as a Scientist* with your students, please send feedback . I'd love to add your practical tips to the list above. Be sure to let me know if it's okay to post your comments so that others can learn from your experience.

**Ordering information**

*My Adventure as a Scientist* is available from Orchard House Press and from Amazon.

**Stories for Growing People by Janet Gingold**

Novels
*Danger: Long Division*
*Finch Goes Wild*

Interactive books
*My Adventure as a Birder*
*My Adventure as a Scientist*
*My Adventure at Summer Camp*
*My Adventure with Arthropods*
*My Adventure with Reptiles*
*My Adventure on the Lake*

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