Dr. Bath's Visionary Patent
Scaffolds Summary

This multimodal text set is designed to help middle school learners work toward mastering the grade-level moderately complex Anchor Text "Dr. Bath's Visionary Patent", adapted from a published patent that describes a new device and method to remove cloudy lenses (cataracts) in eyes of people with diabetes and the elderly (United States Patent No. 4,744,360).

This anchor text and scaffolds address the following standards:

Next Generation Science Standards	ELA Common Core Standards	Mathematics Common Core Standards
MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. **MS-ETS1-1-4:** Engineering Design.	**RST.6-8.1-3:** Key Ideas and Details **RST.6-8.4-6:** Craft and Structure **RST.6-8.7-9:** Integration of Knowledge and Ideas **RST.6-8.10:** Range of Reading and Level of Text Complexity **WHST.6-8.1:** Write arguments focused on discipline-specific content. **WHST.6-8.9:** Draw evidence from informational texts to support analysis reflection, and research.	**Math Content.6.RP.A:** Understand ratio concepts and use ratio reasoning to solve problems. **Math.Content.6.G.A:** Solve real-world and mathematical problems involving area, surface area, and volume. **Math.Content.6.EE.C:** Represent and analyze quantitative relationships between dependent and independent variables. **Math.Content.6.SPA.A:** Develop understanding of statistical variability. **Math.Content.6.SPA.B:** Summarize and describe distributions. **Math.Content.7.SPA.A:** Analyze proportional relationships and use them to solve real-world and mathematical problems. **Math.Content.7.SPA.A:** Use random sampling to draw inferences about a population. **Math.Content.7.G.B:** Solve real-life and mathematical problems involving angle measure, area, surface, area, and volume. **Math.Content.8.SPA.A:** Investigate patterns of association in bivariate data. **Math.Content.8.F.B:** Use functions to model relationships between quantities.

Scaffolds Summary Table of Contents

Science Scaffolds

Science Content Scaffolds		
Scaffold	**Level**	**Description**
Patricia Bath On Being The First Person To Invent & Demonstrate Laserphaco Cataract Surgery *Time*	N/A	**Video:** Patricia Bath is the FIRST person to invent and demonstrate laserphaco cataract surgery. "Sometimes even now when I'm told I was a "first," it comes as a surprise, because it's only through history that you understand that kind of thing."
Dr. Patricia Bath | Black History Nugget | Black History for Kids *KultureKids Media*	Grades 6-12	**Video:** A student-friendly summary of Dr. Bath's biography and contribution to science.
Dr. Bath Describes Laserphaco Invention at 1987 ASCRS Convention *Dr. Bath's YouTube Channel*	N/A	**Video:** Dr. Bath describes her Laserphaco invention in a science convention.
Laserphaco: A historical First in Medicine and Science *Dr. Bath's YouTube Channel*	N/A	**Video:** A TV report on the Laserphaco invention.
Parts of the eye- Human eye & the colourful world *Khan Academy India- English*	N/A	**Video:** Explanation of parts of the eye and their structure & functions including cornea, pupil, iris, crystalline lens, ciliary muscles, aqueous & vitreous humour, retina, & optic nerves. Video is created by Mahesh Shenoy
See What I See: Virtual Reality Eye Disease Experience *NIH's National Eye Institute*	N/A	**Phone Application:** NEI's virtual reality (VR) app created to experience what it's like to live with vision loss from common eye diseases.
Javier in Frame -Google Pixel SB Commercial 2024 *Google Pixel*	N/A	**Video:** A Google ad on the life of an active person with a low vision.
How It's Made - Eyeglass Lenses *How It's Made Archive YouTube Channel*	N/A	**Video:** A video on the manufacturing process that goes into making Eyeglass Lenses.
History of Ophthalmology *American Academy of Ophthalmology:*	N/A	**Article:** An article by American Academy of Ophthalmology on the history of the ophthalmology.
All About the Eye Chart *American Academy of Ophthalmology:*	N/A	**Article:** An article by American Academy of Ophthalmology on the history of the eye chart.

Understanding the Structure of the Eye *Teach Engineering – University of Colorado Boulder*	Grades 8-12	**Lesson Plan:** A lesson plan about the anatomical structure of the human eye and how humans see light, as well as some causes of color blindness. Students conduct experiments as an example of research to gather information. During their investigations, they test other students' vision, gathering data and measurements about when objects appear blurry. These topics help students prepare to design solutions to an overarching engineering challenge question.
Biomedical Devices for the Eyes *Teach Engineering – University of Colorado Boulder*	Grades 6-8	**Activity:** Students examine the structure and function of the human eye, learning some amazing features about our eyes, which provide us with sight and an understanding of our surroundings. Students also learn about some common eye problems and the biomedical devices and medical procedures that resolve or help to lessen the effects of these vision deficiencies, including vision correction surgery. Students get to explore their own design process through the associated activity to help prevent sport related eye injuries.
Patent Searching for SEAS Students *Harvard Library*	N/A	**A website page:** Guide for students on how to read a patent.
EquIP HQ *The US Patent and Trademark Office*	Grades 6-8	**A website page:** A website that includes online activities to learn about trademarks, an interactive timeline of innovation, excursions where you create a prototype for a purpose, and an activity where your goal is to successfully submit a patent for an invention.
The Forgotten Origin of the Scientific Method *Be Smart – Public Broadcasting Station*	N/A	**A Video:** The video summarizes how scientific methods were emerging when the mathematician Al-Hassan Ibn al-Haytham spent hours in a dark room studying the light that filtered in pioneering the scientific methods

Science Inquiry Content Scaffolds		
Scaffold	**Level**	**Description**
Cow's Eye Dissection *Cow Eye Dissection Video Direct Link* *Exploratorium-The museum of science, art and human perception*	N/A	**Video and diagram:** The website includes a video of dissection of cows' eyes to show people how an eye works. This Web site includes an interactive diagram for the eye parts and printables.

ELA Scaffolds

ELA Content Scaffolds		
Scaffold	**Level**	**Description**
Dr. Patricia Bath: The Trailblazing Doctor Who Revolutionized Cataract Treatment & Saved The Sight Of Millions *A Mighty Girl*	N/A	**Article:** Article on the life of Dr. Patricia Bath
Patricia's Vision: The Doctor Who Saved Sight *A Mighty Girl*	Ages 5-9	**Book:** A children book on the life of Dr. Bath
The Doctor With An Eye For Eyes: The Story of Dr. Patricia Bath *A Mighty Girl*	Ages 5-9	**Book:** A children book on the life of Dr. Bath (Age 5-9)
'Notes on Blindness' *New York Times*	N/A	**Article:** Opinion article on the blindness experience
Notes on Blindness *New York Times*	N/A	**Video:** Dramatization of the blindness experience by Peter Middleton and James Spinney
Cataracts by Kamilah Aisha Moon Institute of African American Affairs	N/A	**Poem:** A poem describing what it is like to have cataracts

ELA Instructional Scaffolds		
Scaffold	**Level**	**Description**
Dissecting a Scientific Article *Arizona State University – Ask a Biologist*	Grades 6-8	**Interactive Article**: Describes how to dissect scientific articles and guides step-by-step through an example article.
Anatomy of an Article *Arizona State University – Ask a Biologist*	Grades 6-8	**Article:** Explains each part of a scientific article.
Rolling Journal *Student Achievement Partners. Achieve the Core. Text set*	N/A	**Rolling Journal Strategy:** Students utilize the journal to synthesize information from multiple sources.

project: Building knowledge and vocabulary.		
Think Aloud *Linking Science & Literacy for All Learners*	Grades 6-8	**Think Aloud Strategy:** Outlines protocol for modeling a scientific text think aloud.
Word Tournament *STEM Literacy Project*	Grades 6-8	**Word Tournament Strategy:** Build vocabulary instruction and review and/or summarize learning.
Using the Jigsaw Cooperative Learning Technique *Read Write Think - NCTE*	Grades 3-8	**Article:** Explains how to differentiate instruction using the jigsaw strategy.
CER – Claim Evidence Reasoning *Bozeman Science*	Grades 6-8	**Video:** How to use CER for scientific argumentation.
Claim Evidence Reasoning Graphic Organizer *Gallagher, K. (2011)*	Grades 6-8	**Graphic Organizer:** Guides students through the CER Framework.
Argumentative Frames – A Planning Guide for Students *Linking Science & Literacy for All Learners*	Grades 6-8	**Graphic Organizer:** Guide to plan argument with claim, evidence, and reasoning.
The Multidimensionality of Children's Picture Books for Upper Grades Chapter 15: "Using Picture Books with Older Learners" A How-to Guide for using Picture Books with Older Students Sample Lessons from *Read Write Think - NCTE* *Susan R. Massey* *Martinez et al.* *Pernille Ripp* *Fresch & Harkins*	Grades 6-8	**Picture Books: Rationales and sample lessons that you can use to support picture book use in your classrooms for this and all anchor texts.**

Mathematics Scaffolds

Mathematics Content Scaffolds		
Scaffold	**Level**	**Description**
Visual Impairment in Preschool Children in the United States *Varma et al. (2017)*	N/A	**Data Representations:** Data representations of the projected prevalence of visual impairments among preschool children. Demographic and geographic variations are shown.
Children's Vision and Eye Health: A Snapshot of Current National Issues *National Center for Children's Vision and Eye Health*	N/A	**Data Representations: R**epresentations of various data sets regarding eye health among children

Mathematics Instructional Scaffolds		
Scaffold	**Level**	**Description**
Slow Reveal Graphs *Slowrevealgraphs.com*	Grades 6-8	**Interpreting Data Activity:** Show students a graph without the features (e.g., title, axis labels, legends). Discuss what students notice, wonder, and what they think the data may represent. Then, slowly reveal the graph features one by one. After each reveal, continue to discuss what students notice, wonder, and what they think the data may represent. Once the graph is fully revealed, interpret the graph and discuss the purpose of graph features.
Understanding Two Way Frequency Tables *Activity from Kayla Hogenmiller*	Grades 6-8	**Two Way Frequency Tables Activity:** Complete the following steps: ● Give students a completed two way table to observe and compare. Use something of INTEREST to your students so they can visualize the story that the numbers provide for them. ● Discuss the connections between the first columns with the last. ● Discuss the connections between the first rows and the last. ● Discuss the types of questions that had to be asked to get this information. ● Have students complete a two way table with missing information/numbers. Discuss the types of questions that had to be asked to get this information. Build their own surveys to ask their class. Use that data to complete their own two way table.
Box and Whisker Plots Explained *Math with Mr. J YouTube Channel*	Grades 6-8	**Video:** Interpreting Box and Whisker plot (minimum, median, max).
Understanding and interpreting box plots	Grades 6-8	**Instructional Material:** A short instructional material on the components of the box plots and general observations on them.

wellbeing@school – New Zealand Government		
A Complete Guide to Box Plots *A guide by Mike Yi on Atlassian Website*	Grades 6-8	**Advanced guide on box and whisker plots:** Components, plot options, interpretations, best practices, and visualization tools.
Measuring Your Blind Spot *Neuroscience for Kids – Eric H. Chudler*	Grades 6-8	**Measurement Activity:** Calculate the size of blind spots using similar triangles
How Fast Are You? *Huey et al. (2017) - The American Statistical Association*	Grades 6-8	**Lesson:** Measures of Center and Spread, including mean absolute deviation
12 Engaging Activities for Mean Absolute Deviation *Math Idea Galaxy*	Grades 6-8	**Activities:** 12 Mean Absolute Deviation activities
Fizzy Juice Illustrative Mathematics – National Council of Teachers of Mathematics	Grades 6-8	**Activity:** Introduction to ratios
Exercise Away the Big Mac: Ratios, Rates, and Proportions in Context Ozgun-Koca et al. (2013)	Grades 6-8	**Activity:** Ratios, rates and proportions
Reading and Interpreting Data *Victoria State Government – Department of Education*	Grades 6-8	**Activity:** Reading and interpreting graphs and tables
Part I: Exploring the Data Representations in the Anchor Text Part II: Collecting and Interpreting Your Own Data *Activity from Kayla Hogenmiller*	Grades 6-8	**Part I Analyzing Data Activity:** Students analyze the data representations in the Anchor text by: ● Observing the graphs in the article. ● Discussing the pieces of the graph without the data (title and axis labels) ● Discussing how the data is presented (units) ● Ask the students to tell the story that the data displays. ● Ask students to discuss ideas they deem as missing information. ● Provide a specific questions that will yield the data they feel like they need. **Part II Collecting and Interpreting Data Activity:** Students answer the following questions. Then, they create a Google Form to collect data from their peers. Next, they interpret the data, represent the data, and share the data with their peers. ● If you wanted to collect data to create a graph like the one in the Anchor Text, what questions would you ask?

		• What information would you collect with that question? • How do you present that data? • What information would you like to know about your student body and vaping? • What questions would you ask? • How can you present this data?
Twizzler Lab *Activty Created by Dee Leible*	Grades 6-8	**Activity:** Students measure twizzlers after bites, record and graph the data, and analyze the relationship. This helps them define independent and dependent variables.

Created by the *Linking Science, Math & Literacy for All Learners* team
https://scienceandliteracy.missouri.edu/
with funding from

SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
SUPPORTED BY THE NATIONAL INSTITUTES OF HEALTH