

Lessons in Chemistry

by Bonnie Garmus

Doubleday

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INTRODUCTION

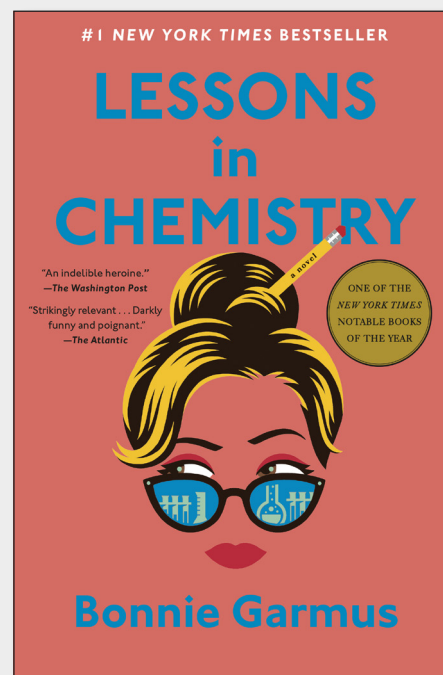
In *Lessons in Chemistry*, Bonnie Garmus's debut novel, protagonist Elizabeth Zott is an intelligent, skilled chemist who consistently outperforms her male co-workers. But she is also a female in mid-century America, so when she becomes pregnant out of wedlock, she is immediately fired. It is no surprise that a novel set in this era has resonated so resoundingly with its audience. Readers need only look to the #MeToo movement to confirm that systemic sexism is still rampant in America. With its themes of institutionalized patriarchy and resistance to change, *Lessons in Chemistry* offers a unique opportunity for today's students to explore their role in confronting these constructs and systems.

The contents of this guide center on the following line of inquiry: How is *Lessons in Chemistry* a social commentary on both mid-century and contemporary America? Students are asked to reflect on this question as they read closely, write critically, make relevant connections and collaborate with peers. Teachers may choose any combination of the suggested questions and activities as students reflect on Zott's and their own potential to become catalysts of change.

ESSENTIAL QUESTIONS

The following questions support the line of inquiry, provide a focus for reading, and can be used before, during, and after reading to prompt discussion, writing, and further research.

- How is sexism systemic in our society? How do individuals and groups support these systems? How do we confront systems in a way that facilitates change?



ESSENTIAL QUESTIONS

- How do authors and artists address the intersection among gender, power, and identity?
- How do we develop voice when society or circumstance has labeled us voiceless? What factors, both internal and external, shape our identities?
- What is the role of science education in our society? What historic and current factors have contributed to inequity in science education?
- What can chemistry teach us about life?
- In what ways has religion shaped our values and traditions? What is the relationship between inquiry and religion?
- How does the function or dysfunction of families contribute to an individual's success?
- What are the traditional contributors to privilege in our country? Is the American Dream a fantasy?

PREPARING TO READ THE NOVEL

SET NORMS

Lessons in Chemistry addresses authentic yet challenging topics such as sexual assault, gender roles, family dysfunction, and religion. Therefore teachers should prepare students for reading and discussing these sensitive issues. Creating a set of norms will ensure equity and promote diverse perspectives. Discuss why the book may cause concern and why it is important to read it, especially in our current culture. Together with students, create a set of classroom procedures for how the class will handle sensitive language and scenes. Provide sentence starters for use during small and large group discussions and read-alouds. Model what academic discourse looks like. Facing History, a website dedicated to helping students and teachers confront bigotry and hate, models possible norms for a "classroom contract" that facilitates a reflective and supportive classroom community. <https://www.facinghistory.org/mockingbird/fostering-reflective-classroom>.

BUILD RELEVANCE

Garmus's novel is set in the fifties and sixties, but the messages about gender and identity are just as relevant now. Build a bridge through the exploration of current art, politics, and culture.

Art

On the board, write the following essential question: How do authors and artists address the intersection among gender, power, and identity? Provide students with lyrics to Taylor Swift's 2019 song "The Man" <https://genius.com/Taylor-swift-the-man-lyrics>. Ask students to read the lyrics individually and make note of any words or phrases that address the essential question or indicate an overall message. Next, show students the official music video including onscreen lyrics <https://prhlink.com/themanmusicvideo>. While watching, students should make additional annotations about the performance and how its choreography, costuming, and artistry underscore, extend, or alter their understanding of the song's lyrics. Students can meet in pairs, discuss thinking, and write a short, written statement that addresses how Swift uses her art to address the intersectionality of gender, power, and identity. Written statements can be posted digitally on Padlet.com or Google Jamboard, where classmates can provide each other feedback. Discuss with the class how Garmus's novel, while set in a bygone era, addresses similar issues.

PREPARING TO
READ THE NOVEL
(CONTINUED)

Politics

Distribute the 2022 Harvard Kennedy School's policy post on the lack of women in leadership, the discriminatory ideas behind it, and the interventions that will address it. <https://prhlink.com/harvardkennedypolicy>

Ask students to apply the 4 A's protocol while reading, focusing on the article's assumptions as well as the reader's agreements, arguments, and aspirations. In this way, students read with a purpose on author intent and reader reaction. The 4th A, "aspiration," asks students to consider their own role, both now and in the future, in influencing this issue of gender, power, and identity. Students can either code in pen or highlight in four different colors. After reading, small or large groups can discuss their thinking, using the text for reference and support. For more information on the 4 A's protocol, visit <https://prhlink.com/4asprotocol>.

Culture

Show students the satirical Superbowl ad that aired on *Saturday Night Live* in 2015 <https://prhlink.com/snlsuperbowlad>. In the commercial, a wife wonders "what's next?" after she has fulfilled her one role of preparing snacks for her husband and his football buddies. Her husband tells the group that his wife need not join the party because she has "an activity pack" full of children's games. After viewing, ask students to discuss their reactions. What issues and stereotypes does the segment highlight? Is this relationship one of balance or imbalance? How does satire serve to convey criticism in our society? Why is such a skit relevant more than fifty years after the setting of *Lessons in Chemistry*? Ask students to look for satirical elements as they read the novel.

BUILD KNOWLEDGE

Lessons in Chemistry contains historic and cultural references that may be unfamiliar to some students. In order to provide an equitable environment where all students have equal access to the text, provide opportunities to build an understanding of context. Not all knowledge should be "front loaded." While some topics might need to be investigated prior to reading, others can be explored when they arise in the text. Possible topics, activities, and links are listed below.

- Ask students to reflect on advertisements from the 1950's and 1960's. (<https://prhlink.com/businessinsiderads>) Invite partners or small groups to select one to analyze and share out. As a class, discuss how a patriarchal culture was intentionally cultivated. Additional information on ad analysis can be found at <https://www.medialit.org/reading-room/how-analyze-advertisement>.
- Watch the 1951 premier of the Jack Lalanne Show and discuss Lalanne's significant contribution to America's exercise culture. Point out Lalanne's "ballet slippers," similar to those mentioned in the novel several times. (<https://prhlink.com/jacklalanneshow>)
- Discuss the role of rowing in history, culture, and *Lessons in Chemistry*. Show a vintage rowing competition such as the 1951 Cambridge-Harvard race. (<https://prhlink.com/cambridgeharvardrace>) As a class, reflect on the physical, mental, and collaborative skills and benefits observed in the video. Ask, "How does balance play a significant role in the boat? What bonds are created and utilized by the rowers? How is rowing similar to chemistry?"
- Invite students to research twentieth-century women in STEM careers. Provide a link to the collection of podcasts "The Untold History of Women in Science and Technology." (<https://obamawhitehouse.archives.gov/women-in-stem>) Ask individual students or pairs to listen to one of the podcasts and write a short summary of the scientist's accomplishments that can be shared with classmates digitally on the class whiteboard, Padlet, or Jamboard.

INDEPENDENT AND GROUP ACTIVITIES

CLOSE READING

Encourage student readers to “deep dive” into *Lessons in Chemistry*. The close-reading process focuses on excerpts, or “chunks,” of text, promoting the high-level interpretation and critical thinking expected of college and advanced high school students. Choose a scene or short excerpt from the novel. Scenes that work well for close reading include: Elizabeth and Calvin’s discussion on sexual discrimination (25–27); the chapter on “overreaching” in rowing and at work (67–69); Madeline’s fairy godmother and the family tree (228–32); and the “chemistry is life” chicken pot pie television segment (258–61). Ask students to perform three reads. If any of the reads are to be conducted out loud, remind students of class norms for handling sensitive language and topics. (See the “set norms” section at the beginning of this guide). After each read, one of the following questions can be discussed with a partner or group and answered in writing. After the first read, students warm-up with a simple context question: “What is happening in this section?” In the second read, students delve into the author’s purpose: “What is this section beginning to be about?” Finally, after the third read, students focus even deeper: “Which words and phrases contribute to the text’s meaning and tone?” For all three questions, students must return to the text and cite evidence. For more information on close reading, view the following Douglas Fisher video: <https://prhlink.com/douglasfisherid>.

IDENTITY CHART

Challenge students to think critically about how identity is formed, both in *Lessons in Chemistry* as well as in society. According to the organization Facing History and Ourselves, identity charts can “deepen students’ understanding of themselves, groups, nations, and historical and literary figures.” Before asking students to create a chart for one of Garmus’s characters, model an exemplar chart for the class. Place the character’s name in the center of a starburst. At the end of each ray extending from the character’s name, fill in a text box with a short, defining characteristic. For example, characteristics for Elizabeth Zott might include “skilled chemist,” “single mother,” and “catalyst of change.” Next students create their own identity charts for a different character in the novel. For a more challenging analysis, ask them to select one of Garmus’s secondary or minor characters, such as Wakely, Miss Frask, or Donatti. Prompt students to think even more critically by facing some arrows inward and others outward. The rays facing inward reflect how characters see themselves, while the rays facing outward depict the way they are seen by society. For example, outward facing rays for Six-Thirty might read “mutt,” “stubborn,” and “loyal,” while his inner facing rays say “guilty,” “hates leashes,” and “worried about my humans.” The goal is to reflect on how identity is shaped and stereotypes built by both internal and external factors, not only in the text, but in students’ lives, as well.

Once the chart is complete, students can synthesize their reflection in a summary statement at the bottom of the page. For example, students might write, “While Six-Thirty is a charming and intelligent companion from the start, his complex feelings of grief, guilt, and resilience ultimately bond him to and make him a mirror of Elizabeth Zott. Neither character will be leashed ever again.” The summary statements can stand alone or can initiate more extended writing products. Finally, students can create their own identity charts, and if they choose, share them with peers in order to build community and challenge stereotypes. For templates and more information about identity charts, see <https://www.facinghistory.org/resource-library/identity-charts-1>.

CLAIM, EVIDENCE, REASONING

Ask students to reflect on Garmus’s “Chemistry Is Life” argument by pairing the novel with a science article. First, ask students to re-read the last two paragraphs on page 273 of the novel.

**INDEPENDENT AND
GROUP ACTIVITIES
(CONTINUED)**

“Feeling like one doesn’t fit is a horrible feeling. . . . Humans naturally want to belong—it’s part of our biology. But our society makes us feel that we’re never good enough to belong. . . . Because we measure ourselves against useless yardsticks of sex, race, religion, politics, schools. Even height and weight. . . . In contrast, *Supper at Six* focuses on our commonalities—our chemistries. So even though our viewers may find themselves locked into a learned societal behavior . . . the show encourages them to think beyond that cultural simplicity. To think sensibly. Like a scientist.”

After re-reading, ask students to partner-read the article “Race is a Social Concept, Not a Scientific One.” As they read, partners should discuss and record their thinking using the Claim, Evidence Reasoning (CER) strategy. In this protocol, students identify the writer’s claims and supporting evidence before analyzing the article’s reasoning. Once the CER analysis is complete, students are prepared to discuss the article’s arguments. As a large group, discuss: How does reading about science add to your understanding of Elizabeth Zott’s character? How does the novel serve as a social commentary on current issues around gender, race, and more?

Article: <https://prhlink.com/livescience>

FLIP VIDEO

Common reading engages students by building community and enriching learning through a shared experience. Encourage students to collaborate or “back channel” while reading *Lessons in Chemistry*. Using the free video discussion app <http://Flip.com>, students meet asynchronously in small or large groups to pose or answer questions throughout their reading, or to reflect on a topic or quotation posted by the instructor. Sample teacher prompts might look like “What stood out to you in this chapter, and why?” “Why did the author choose to have Zott tap her pencil here?” Teachers can provide conversation starters, as well. Students might be provided with starters such as, “The most significant word or phrase in this section has to be . . .” Because students can respond not only to original prompts but to one another’s video reflections, students monitor and manage their own learning and provide one another feedback that feeds forward.

AUTHOR INTERVIEWS

The media reception surrounding *Lessons in Chemistry* provides a rare opportunity for readers to connect to its author. Show students the *Good Morning America* book club interview with Bonnie Garmus. In it, the author discusses her own as well as Elizabeth Zott’s motivation to show women their capabilities and to make them understand themselves and their world “at a molecular level.” Just as Zott teaches her “*Supper at Six*” audience how to make serious change, Garmus inspires readers to change the status quo. Ask students to watch and annotate their reactions to the interview. Next, show students Garmus’s interview with NPR, where she discusses how she came to write specific components of her novel, and how she appreciates the balance and respect between Elizabeth and Calvin as well as between Elizabeth and her audience. Again, students should note reactions, including what surprises them or what they admire about Garmus’s process. As a class, discuss the following: Taken together, what do these author interviews reveal about the author’s choices and inspiration? How does hearing from the author in this way change, confirm, or extend your understanding of *Lessons in Chemistry*?

GMA interview: <https://prhlink.com/gmainterview>

NPR interview: <https://prhlink.com/nprinterview>

Seattle Times interview: <https://prhlink.com/seattletimesinterview>

CULMINATING WRITING ASSESSMENT

A culminating assessment provides students with a frame for reading and analyzing the novel, and it provides a personalized, formal writing opportunity at the end of the

INDEPENDENT AND GROUP ACTIVITIES (CONTINUED)

reading. Students should be introduced to this prompt prior to reading so that they read with a purpose. Prompts should be complex enough to encourage critical thinking and to promote a variety of student responses. Students can apply thinking and evidence from their during-reading annotations and from the activities outlined in this guide as they respond to the prompt. The essential questions at the beginning of this guide can serve as culminating writing prompts, or students might respond to a more text-specific prompt such as one of the following.

- Analyze how Garmus conveys theme(s) of abandonment, identity, and resilience (or choose another theme) through purposefully chosen literary elements and techniques. Focus may include but is not limited to diction, imagery, and point of view. Use explicit text evidence to support your thesis.
- Write an essay in which you analyze how Garmus's distinctive style reveals her purpose in *Lessons in Chemistry*. Consider her juxtaposition of past and present, her use of characterization, a specific motif, or another of her writer's crafts. Support your thesis with examples and details from the text.

Using one of the prompts above, students might analyze Garmus's pencil motif and how it is used to signify the armor Elizabeth is never without. Or, writers might discuss the book's treatment of educational equity by analyzing Mrs. Mudford. As an extension, students can meet in peer feedback groups, either in person or online, to plan, revise, and publish their work.

SOCRATIC SEMINAR

Hold a Socratic Seminar on one scene, chapter, section, or the entire text of *Lessons in Chemistry*. Prior to the seminar, discuss with students what an ideal seminar looks and sounds like, including participation, active listening, and respect of multiple viewpoints. Ask students to set a class goal, such as: "I will contribute to the discussion at least one time," as well as a personal goal, such as: "I will mention a classmate's name and extend on or disagree with their thinking." Students can record their goals on paper or sticky-notes which are visible to them during the seminar. During the discussion, take a facilitator's role. Ask a low-risk opening question to encourage total class participation in a round robin response, such as: "What is the most prevalent 'lesson in chemistry' from this chapter?" The opening question might be provided the night before. Its purpose is to identify main ideas in Garmus's text. After all have responded, hold a brief discussion on ideas that emerged. Then move to a core question for the purpose of analyzing text details, such as: "How does Elizabeth's 'atoms and molecules' assertion on page 331 support Garmus's intent in this scene and beyond?" End the discussion with a closing question that promotes personalization and application, such as: "How might this chapter's themes and ideas apply to a contemporary social issue?" After the seminar, ask students to evaluate their own and their classmates' speaking, thinking, and listening. Did they meet their class and personal goals? What should the class do differently in the next seminar discussion? How did the Socratic seminar deepen their understanding of Garmus's text?

FOUND POEM

Prompt students to explore meaning and synthesize interpretation of Garmus's text by creating a "found poem." Ask students to select specific words, phrases, and quotations from *Lessons in Chemistry* and rearrange the language to underscore a significant theme from the novel. Each student can create an individual poem, or the class can compose one together. First, ask students to select approximately 15–25 words and phrases from the novel that are significant or meaningful. Next, students brainstorm a theme and message found within some or all of these choices. For

**INDEPENDENT AND
GROUP ACTIVITIES
(CONTINUED)**

instance, students might see that most of their chosen excerpts touch on the theme of catalysts, and the message might be that using chemistry as a model, we are all capable of affecting change. Once students have settled on a theme and message, they will compose their found poem by arranging the author's words, phrases, and quotes in an order that expresses the identified message. While students can repeat words and phrases as often as they like, and while they may add punctuation, conjunctions, articles, and prepositions to piece the poem together, they should not deviate from Garmus's language. Remind them that they do not need to use all the originally selected words and phrases. Students can use font, spacing, and justification to make their poems unique. They should add a title that may or may not come from the novel. Students can share their poetry online via Padlet, Jamboard, or the classroom platform, or they might hold a poetry jam session where they perform aloud. A final class discussion might focus on new insights students derived from the found poem strategy. For more information on found poetry, see <https://www.facinghistory.org/resource-library/found-poems>.

POLITICAL CARTOON ANALYSIS

Ask students to analyze a recent editorial cartoon in order to draw connections between *Lessons in Chemistry* and current events. For instance, provide a copy of Peter Kuper's New Yorker editorial cartoon that depicts a female Puritan suspended over a river. <https://condenaststore.com/featured/if-she-floats-peter-kuper.html>. The picture's caption reads, "If she floats, she's a witch. If she sinks, maybe she had a point about women's rights." Using the observe, reflect, question protocol, ask students to work independently or in pairs to analyze the image's objects and words, possible meanings, and broader implications. A template for this activity is provided by the Library of Congress at <https://prhlink.com/locpoliticalcartoon>. After students have recorded their thinking, hold a class discussion. Ask: What do we see in regards to balance and power in this image? What attitudes and assumptions does the image illustrate? In what ways does this current editorial cartoon relate to *Lessons in Chemistry*?

MULTI-MEDIA RESPONSE

Once students have completed the novel, encourage them to extend and personalize their analysis of Garmus's text by producing a multimedia response. Students will conduct research and produce a digital product that answers one of the essential questions from the beginning of this guide. Students might choose to respond in the form of a video speech, podcast, digital story, interactive webpage, or a different format that can be published for an audience. As an example, reintroduce the essential question "How is sexism systemic in our society? How do individuals and groups confront this issue in a way that facilitates change?" As a model response, show students Michelle Obama's "Be Better" discussion at the 2016 White House Summit on the United State of Women <https://prhlink.com/michelleobamadiscussion>. In this discussion with Oprah Winfrey, Obama addresses the continued imbalance between men and women at home and in the workplace. As they watch the discussion, ask students to note words, phrases or lines that connect to big ideas in *Lessons in Chemistry*. As a class, discuss the issues raised in both Obama's speech and Garmus's novel, then discuss how both Obama and Zott are catalysts of change. Students now select another of the essential questions and produce their own digital response to a big idea from Garmus's text.

RELATED TITLES

The following titles relate to themes and topics found in *Lessons in Chemistry*, and can be used for extension activities or further reading.

The Awakening. (Fiction novel) <https://prhlink.com/theawakening>

Bombshell. (Motion picture) <https://www.imdb.com/title/tt6394270/>

The Boys in the Boat: Nine Americans and Their Epic Quest for Gold at the 1936 Berlin Olympics. (Narrative nonfiction) <https://prhlink.com/theboysintheboat>

Chemistry. (Fiction novel) <https://prhlink.com/chemistry>

A Dog's Purpose. (Motion picture) <https://www.imdb.com/title/tt1753383/>

Engendered. (Podcast) <https://engendered.us/>

The Eyes of Tammy Faye. (Motion picture) <https://www.imdb.com/title/tt9115530/>

The Exceptions: Nancy Hopkins, MIT, and the Fight for Women in Science (Narrative nonfiction) <https://prhlink.com/theexceptions>

Bonnie Garmus's review of *The Exceptions*: <https://prhlink.com/exceptionsnyt>

The Feminine Mystique. (Non-fiction) <https://prhlink.com/thefemininemystique>

How to Argue with a Racist. (Non-fiction) <https://prhlink.com/theexperiment>

Julie and Julia. (Motion picture) <https://www.imdb.com/title/tt1135503/>

Lab Girl. (Memoir) <https://prhlink.com/labgirl>

Mad Men. (Television series) <https://www.imdb.com/title/tt0804503/>

Philomena. (Book) <https://prhlink.com/philomena>

Philomena. (Motion picture) <https://www.imdb.com/title/tt2431286/>

You Don't Own Me. (Song recording) <https://prhlink.com/youdontownmesong>

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