POWER ON!

Facilitator Guide

By: Megan Bowen, Sarah Ciras, Shanti' Coaston, Shaina Glass, Lilibeth Mora, and Elizabeth Naameh
with support by: Jean J. Ryoo, Jane Margolis, and Michelle Choi

Based on the *Power On!* graphic novel
poweronbook.com

Foreword

A NOTE FROM THE CREATORS OF THIS GUIDE

Dear Reader:

The *Power On!* Facilitator Guide was developed by a dynamic team of Computer Science Teachers Association (CSTA) Equity Fellow alumni. We had educators, facilitators and leaders of computer science education in mind while creating resources and instructional materials that support all learners in utilizing the graphic novel to bring awareness to the inequities students face in Computer Science (CS).

We believe ALL students deserve access to a rigorous and comprehensive computing education – and that includes thinking critically about technology. Through the curation of pre-readings, discussion questions, and extension activities, we hope both educators and learners engage in these crucial conversations about the very human issues at the center of these fields – issues such as algorithmic bias. We also hope that P*ower On!* empowers all readers to collaboratively advocate to address those challenges.

Sincerely,

Megan Bowen, Technology Coordinator, Integration Specialist, & CS Teacher, Grades 6-12, at Salem Academy Charter School (Salem, MA)
Sarah Ciras, Special Educator, Grades 9-12, at Landmark School (Beverly, MA)
Shanti' Coaston, CS Teacher at Shaw High School (East Cleveland, OH)
Shaina Glass, Program Director of Technology Applications & STEM, at Aldine ISD (Houston, TX)
Lilibeth Mora, Equity Teacher Leader & Instructional Coach, at Vallejo City Unified School District (Vallejo, CA)
Elizabeth Naameh, Data Science Coach, Multiverse (Los Angeles, CA)

A NOTE FROM THE AUTHORS OF *POWER ON!*

Dear Reader:

We wrote *Power On!* to create a resource that sparks conversation and questions around what, for some, may be challenging but pressing topics of our tech-saturated world. We believe that technology and computing can no longer pretend to be "neutral," as much research has shown how tech is responsible for both good and harm (see pages 68-69 of *Power On!*). We must all be engaged with critical thinking about computing and its relationship to today's society, and especially in contexts where young people and adults are coming together to share, grow, and learn. In fact, youth have told us that their engagement with learning increases when Computer Science (CS) is connected to their lives and the issues they care about – and seeing this need to amplify youth voice and agency in CS education is precisely why we created the *Power On!* graphic novel.

We partnered with CSTA Equity Fellows to develop this guide because we could think of no one better to offer fellow educators the support they may want and need when using *Power On!* in both classrooms and out-of-school settings. The authors of this resource are educators with years of experience teaching computer science across different grade levels and learning contexts throughout the U.S. They have created and curated resources and activities that we know you will find useful. Another reason we wanted to work with the CSTA Equity Fellows on this effort is because together we are able to do more than alone! And in that spirit, we want to emphasize that this guide is a living and breathing document and we welcome any of your input, ideas, and improvement at poweronbook@gmail.com.

Sincerely,

Jean J. Ryoo & **Jane Margolis**
co-authors of *Power On!*

Using the Guide

The *Power On!* Facilitator Guide was created to support discussions and Computer Science (CS) learning accompanying the reading of the *Power On!* graphic novel (Ryoo & Margolis, 2022, MIT Press, poweronbook.com). The guide is intended to help educators, administrators, out-of-school program facilitators, professional development providers, parents, caregivers, and anyone interested in engaging youth in learning discussions about how technology impacts our lives and our world.

Both the guide and the graphic novel were written with middle school and high school (grade levels 6-12, ages 11-18) audiences in mind and are designed for use in both CS and non-CS disciplines, in and out of school, by facilitators with any or background in CS. Each of the 7 chapter guides list target audience and recommended alignment to standards, but we believe that educators know best what works for their learners, goals, and environment. You may use all of the guide, part of it, or adjust it to fit your needs.

We recognize that the world is continuously evolving, so we see this as a starting point - not an end point. We plan to update the guide with feedback and new activities from the field. Our hope is that this guide can be an entrypoint into critical learning conversations about the Computer Science topics described in the *Power On!* graphic novel and serve as an invitation for more voices and thinking about the ethical and social implications of technology.

The *Power On!* Facilitator Guide is divided into three sections:

- **GETTING READY**
  - Chapter 0: This introductory section is for facilitators to prepare for effectively engaging diverse youth perspectives and voices. We recommend all users of this guide regardless of familiarity with CS or equity-related topics review this section as professional development in order to gain a better understanding and background of the topics raised in the subsequent chapter guides
- **CHAPTER GUIDES**
  These seven chapter guides provide lesson planning resources, discussion questions, and extension activities that correspond with each chapter of the novel. Each chapter guide includes:
  - An overview summary of the book chapter
  - Key topics raised in the chapter
  - Background resources as suggested facilitator pre-work and pre-reading
  - Learning objectives
  - Alignment to Computer Science Teachers Association (CSTA) Standards
  - Vocabulary terms and definitions
  - Discussion and reflection questions linked to key topics raised in the chapter
  - Comprehension questions to check for understanding of characters, plot, vocabulary, etc.
  - Extension activities that allow learners to dive deeper into CS learning and some of the topics raised in the chapter. Note that activities have been curated from various sources, organizations, and curriculum providers.
- **APPENDIX**
  - Topic index by chapter
  - Glossary of terms and definitions
  - Handouts and answer keys for discussion questions and comprehension questions

Here are some suggestions of possible ways of using the guide:

- Use as a stand-alone unit for a middle school or high school computing course
- Select which chapter guide is tied to existing CS course topics such as Algorithmic Bias in Chapter 1 for Advanced Placement Computer Science (AP CS) or Advanced Placement CS Principles (AP CSP). See the Topic Index provided in the Appendix on page 55.
- Select resources or activities to support independent study or student-led projects based on topics found in the book
- Integrate into other STEM subjects and beyond CS in Civics, Ethics, History, and other disciplines.
- Use as a reading and discussion tool for library programs, English classes, ELA programs, reading clubs, or afterschool programs.
- Facilitate as professional development workshop with educators, administrators, librarians, program facilitators
- Pick relevant discussion questions to reflect on as an individual or group/family.

Acknowledgements

The *Power On!* Facilitator Guide would not exist without the CSTA Equity Fellows - Megan Bowen, Sarah Ciras, Shanti' Coaston, Shaina Glass, Lilibeth Mora, and Elizabeth Naameh - and without the support of Jake Baskin and Bryan Twarek at CSTA. We have deep appreciation for all reviewers of this educator resource, including: Christy Crawford, Emily McLeod, Daniel Voloch, Shana White, and Don Yanek. We would also like to thank the National Science Foundation, Bill & Melinda Gates Foundation, and Google CS-ER that funded the student voice research described in *Power On!*. Any opinions, findings, conclusions and/or recommendations expressed in the book as well as this educator resource material are those of the authors and do not necessarily reflect the views of the funders. Finally, none of this would be possible without the support of Michelle Choi who kept us organized as we embarked on this educator resource adventure, and who created the beautiful design of these pages.

Table of Contents

GETTING READY 6

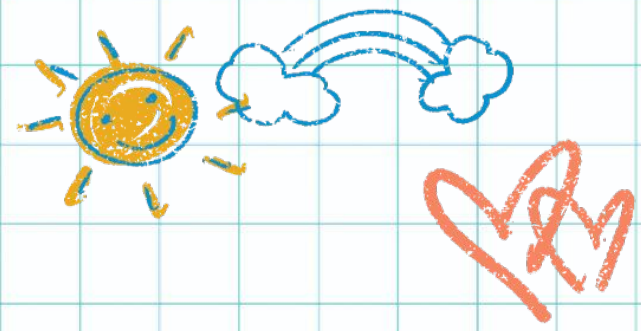
Chapter 0 7

CHAPTER GUIDES 10

Chapter 1 This Is Messed Up 11
Chapter 2 Summertime 18
Chapter 3 High School Begins 24
Chapter 4 Why Do We Need to Learn Computer Science? 30
Chapter 5 Someone Like Me 36
Chapter 6 We Are the Change We Want 42
Chapter 7 Students Take Lead: Computer Science for All 48

APPENDIX 54

Topic Index 55
Glossary 56
Handouts & Answer Keys 61



GETTING READY

Chapter 0

This introductory section is designed to help facilitators prepare for supporting discussions around topics found in *Power On!*. As our world and technology are ever-changing, we can all benefit from personal and professional learning regarding issues of underrepresentation in computing, ethics, and equity. It is expected that educators will have differing levels of knowledge, experience, and comfort levels with leading and facilitating discussions around these topics. ***It is recommended that all users of the Power On! Facilitator Guide review this section.***

Key Topics in *Power On!*

- Algorithmic Bias and Artificial Intelligence (AI)
- Careers with Tech
- CS Heroes
- How to Be an Ally
- Identity, Culture, and Belonging
- Stereotypes of Who Does CS
- Technology for Good or Harm
- Underrepresentation in CS and Its Impact
- What is "Good Trouble"?
- Youth Voice and Agency

*See full list of topics in Appendix

Why these topics?

The story of *Power On!* shows how the underrepresentation of Black, Brown, other People of Color, and women really matters as it not only impacts future opportunities for young people, it also impacts what tech gets created and whom it harms. The book illuminates the topics listed above that were identified by public school students and educators as important to discuss in learning contexts, both in and out of school. This research by *Power On!* book authors, Jean Ryoo and Jane Margolis, revealed that it is this connection between computing and what youth care about that increases CS engagement for a more diverse population of students. To learn more, see this video of Jean and Jane describing the research behind the book and the key topics raised.

The resources below provide a systemic analysis of equity in CS education with language to think about why CS education does not sit on its own isolated island. These resources offer useful arguments for why ethics and social responsibility must be part of CS education in today's world. The next page includes resources to support authentic self-reflection around issues of identity in order to help build brave and inclusive learning spaces. We invite you to explore the link and choose what useful for you depending on your background and/or familiarity with these topics.

Though some of these professional development activities may be time-intensive or challenging, we hope they will increase facilitators' self-efficacy around facilitating discussions around these critical topics and developing more inclusive learning spaces where students–especially those who have been underrepresented—feel a sense of belonging, trust, respect, and increased engagement in CS. In addition to the information and links provided below, each chapter guide includes a section called "Background" that has additional recommended articles, videos, and other resources relevant to key topics from that chapter.

Why does the Computer Science field lack diversity?

- *Stuck in the Shallow End: Education, Race, and Computing* book by *Power On! co*-author Jane Margolis with Rachel Estrella, Joanna Goode, Jennifer Jellison Holme and Kimberly Nao. Learn about how race- and gender-based stereotypes get institutionalized, impacting who has access to CS education opportunities.
- *What Do We Really Know about Equity, Diversity, and Inclusion in CS?* presentation by Lien Diaz, Constellations Center for Equity in Computing, Georgia Tech. Obtain strategies to incorporate principles of equity, diversity, and inclusion in discussions about culture & social interactions.

What is Culturally Responsive-Sustaining Pedagogy and why is it so important?

- *What is Culturally Responsive Teaching?* EdWeek article by Madeline Will and Ileana Najarro
- *Culturally Responsive-Sustaining CS Education Framework* report by Kapor Center
- *Culturally Responsive Teaching & the Brain* book by Zaretta Hammond
- *Cultivating Genius: An Equity Framework for Culturally and Historically Responsive Literacy* book by Ghouldy Muhammad

Why are Ethics and Social Responsibility important for Computer Science education?

- *The Humanities are Integral to Computer Science: We must teach more than just how to code* article by Elizabeth Naameh, CSTA Equity Fellow
- *Let's Teach Computer Science Majors to Be Good Citizens. The Whole World Depends on It* EdSurge article by Anne-Marie Núñez, Matthew J. Mayhew, Musbah Shaheen and Laura S. Dahl
- *Ethics, Identity, and Political Vision: Toward a Justice-Centered Approach to Equity in Computer Science Education* article by Sepehr Vakil, Northwestern University
- *Do You Really Want an Inclusive CS of the Future?* video of the CSTA The Future Of CS Summit keynote presentation by Nicki Washington, Duke University
- *2020 Vision: Reimagining the Default Settings of Technology and Society* video of the CSTA 2020 Conference keynote presentation by Ruha Benjamin and follow up session recording: A Critical Conversation about Racism and Computer Science with Ruha Benjamin, Shana V. White, Shanti' Coaston, Charity Freeman, Michelle G. Lee, and Rebecca Luebker

We believe that the stronger our own understanding becomes regarding why ethics, social responsibility, anti-racism, critical thinking and inclusivity are for CS education, the further we will be able to support our learners' educational trajectories. We also believe that there is no substitute for authentic self-reflection about our own sense of identity, biases, comfort or discomfort with challenging conversations. The activities, professional development resources, and considerations below are meant to be useful for people of all experience levels to explore ourselves as educators and co-developers of brave spaces for learning and discussion.

Authentic Self-Reflection

- *How To Find Yourself: 11 Ways To Discover Your True Identity* self-directed reflection tool from A Conscious Rethink
- *Exploring My Power and Privilege Toolkit* from the Canadian Centre for Diversity and Inclusion
- *Teaching at the Intersections - Honor and teach about your students' multiple identities* article by Monita K. Bell from Learning for Justice
- *Uncovering Your Implicit Biases: An Exercise for Teachers* by Hedreich Nichols, author of *Finding Your Blind Spots*
- *Intent vs. Impact: Why Your Intentions Don't Really Matter* article from Everyday Feminism by Jamie Utt
- Professional development opportunities listed in alphabetical order below:
  - *Cultural Competency in Computing 3C Fellows Program* by the Alliance for Identity-Inclusive Computing Education (AiiCE)
  - *Inclusive Teaching Pedagogies* and *Identity Inclusive Computing Professional Learning Resources* by CSTA
  - *Education for Liberation Network*
  - *Center for Equity Leadership virtual trainings (paid) by National Equity Project*

Co-Creating Brave Spaces for Learning and Discussion

- Implement Inclusive Teaching Practices
  - *Tips for Making Classrooms More Inclusive as Students Head Back To School* article from Human Rights Campaign
  - *Setting the Tone for Inclusive Classrooms* instructor resource from the University of Michigan Inclusive Teaching website
  - *Types of Non-Inclusive Language* blog essay by Heather Barbour
  - Inclusive Language Guide from the Institute for the Future Education by Paola Villafuerte
- *Create Collaborative Classroom Norms* strategies from the University of Colorado Boulder
- *Making the Most of Hot Moments in the Classroom* strategies from University of Michigan Center for Research on Learning and Teaching (CRLT)
- Consider a *Restorative Justice* approach with resources from Edutopia by Matt Davis
- *Build Community in the Classroom* article by Perry Hollins from Houghton Mifflin Harcourt
- *Fostering Civil Discourse* with *Head, Heart, Conscience* and *Save the Last Word for Me* teaching strategies from Facing History

Hearing from Other Educators

- Read *stories* or watch *flash talks* by CSTA Equity Fellows

CHAPTER GUIDES

CHAPTER 1
THIS IS MESSED UP

Chapter 1

Overview

Chapter 1 introduces the reader to four friends - Taylor, Christine, Antonio, and Jon. The reader learns about their racial and ethnic backgrounds, hobbies, and family dynamics. In this chapter, the four friends realize how Computer Science (CS), technology, and computing are impacting their lives and community, and begin to be curious about what CS actually involves. The reader will be presented with Computer Science definitions (e.g., Artificial Intelligence, Algorithms, etc.), workforce statistics, news stories related to bias in technology, and current research in AI by a prominent computer scientist.

Topics

- Algorithmic Bias and Artificial Intelligence
- Gender Norms
- Home Life Struggles
- Identity, Culture, and Belonging
- Technology for Good or Harm
- Underrepresentation in CS and Its Impact

Background

The main themes presented in Chapter 1 are culture (identity and belonging), technology (for good or for harm), bias in artificial intelligence, and the impact of underrepresentation in computing. We recommend facilitators prepare to engage learners with these topics by exploring some of the following resources beforehand:

- *Is Society Moving In The Right Direction With Technology Rapidly Taking Over the World?* article by Forbes (5 min)
- *Fixing Tech's Ethics Problem Starts in the Classroom* article by The Nation (5 min)
- *I Identify* short film based on "Little White Lie" by PBS Independent Lens (4 min)
- *Stuck in the Shallow End: Education, Race, and Computing* book by *Power On!* co-author Jane Margolis with Rachel Estrella, Joanna Goode, Jennifer Jellison Holme and Kimberly Nao.

Objectives

Students will be able to at the end of this lesson...

- define *artificial intelligence.*
- define *algorithm*.
- identify a technology that has caused harm.
- identify and discuss the underrepresentation of Black, Brown, Native/Indigenous, and other People of Color communities and women in the field of Computer Science through statistics.

CSTA Standards

- **2-IC-20** Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- **2-IC-21** Discuss issues of bias and accessibility in the design of existing technologies.
- **3A-IC-24** Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
- **3A-IC-25** Test and refine computational artifacts to reduce bias and equity deficits.
- **3A-IC-27** Use tools and methods for collaboration on a project to increase connectivity of people in different cultures and career fields.

Discussion Questions

1. What are examples of algorithms that you use in everyday life?
2. Do you think robots or technology can be racist?
3. Do you think there is a connection between the low numbers of Black/African American people in the tech industry and the misidentification of a Black man by the AI facial recognition system? Why or Why not?
4. Why do you think only 29% of the AP Computer Science test-takers were girls, even though 56% of AP test-takers girls were?
5. What is the number OR percentage of students that are taking computer science in your state?
6. How many high schools in your state offer computer science?
7. In your state, how many Black, Brown, Indigenous/Native, and other People of Color and those who identify as women, have taken the AP Computer Science Principles and/or AP CSA exam in the last two-three years?
8. Why do you think there has been racial bias in facial recognition systems?
9. What character do you most identify? Explain your answer.
10. Have you ever directly experienced bias? How? When? Why?
11. Why do you think this chapter is titled, "This is Messed Up?"

**Student handout in Appendix*

Comprehension Questions

**Student handout and answer key in Appendix*

1. Where is the setting of this story?
2. What are Antonio's parents fighting about?
3. What is the name of the restaurant that the friends hangout at?
4. Why is Christine enrolled in summer school and what course is she taking?
5. What are Antonio and Taylor going to miss about not being at the same school with Christine?
6. What newsfeed made Antonio upset?
7. What is Artificial Intelligence?
8. What are some characteristics that artificial intelligence can learn?
9. What is an algorithm?
10. List 2 articles that Antonio found when he searched "racist AI" on his phone.
11. What is the name of the computer scientist who is fighting “bias in algorithms" AND what was the issue that this person discovered in her research? What did she have to do in order for her computer to recognize her?
12. What is the percentage of the Black and Latinx workforce in comparison to the Black and Latinx population in California?
13. Only 26% of the professional computing occupations are held by women, even though women make up 50% of the population. Of the 26%, what is the percentage of the women in tech that are African-American, Asian, and Latina?
14. What is the percentage of students that are enrolled in Computer Science courses in the state of California?
15. Describe the four main characters in this graphic novel. What do we know about each character so far?

Vocabulary

Term	Definition
Algorithm	A process or set of rules to be followed in calculations or other problem-solving operations especially by a computer
Artificial Intelligence	The ability of a digital computer or computer-controlled robot to perform tasks commonly associated with human beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience.
Bias	Prejudice in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair.
Chatbot	A chatbot or chatterbot is a software application used to conduct an on-line chat conversation via text or text-to-speech, in lieu of providing direct contact with a live human agent. A chatbot is a type of software that can help customers by automating conversations and interacting with them through messaging platforms.

Vocabulary (cont.)

Term	Definition
Ethnicity	While this is a contested term among anthropologists, sociologists, and others, this generally refers to identification based on shared culture, where people live, language(s) spoken, etc.
Identity	How one defines oneself in relation to qualities, beliefs, cultural practices, and more. This may or may not be defined according to racial/ethnic identity, gender identity, family origins, etc.
Juneteenth	Juneteenth commemorates the effective end of slavery in the United States. After the abolishment of slavery in the United States, white people refused to follow the new law and continued to keep African American people enslaved. African American enslaved people were denied access to information about their freedom and had no power to free themselves. Juneteenth (short for "June Nineteenth") marks the day when federal troops arrived in Galveston, Texas in 1865 to take control of the state and ensure that all enslaved people were freed.
Kimbap	Korean version of sushi rolls with cooked meat and vegetables inside
Latinx	Refers to the ethnicity of people who are from or have a background in a Latin American country. Since "Latino" is a masculine adjective in the Spanish language and does not give visibility to those who do not identify as men, the term "Latinx" was created with the intention to be inclusive of all gender identities.
Nationality	A legal identification of a person in international law, establishing the person as a subject, a national, of a sovereign state. It affords the state jurisdiction over the person and affords the person the protection of the state against other states.
Niños	"Kids" in Spanish
Pupusas	Salvadoran cornmeal or rice flour griddle cakes filled with meat, cheese, beans and/or vegetables
Race	A social construct that is not rooted in science, but has been created by humans to identify groups based on shared physical characteristics. Race does not clearly delineate identification based on ancestry, heritage culture, etc.
Racism	A system that gives power to some and oppresses others based on race. It is the result of social and institutional powers working in tandem with racial prejudice. There are different forms of racism, for example interpersonal, internalized, institutional, and structural to name a few. Interpersonal racism occurs between individuals. Internalized racism is when people apply the system of power and oppression to oneself, resulting in self-hatred and believing that one deserves to be disadvantaged. Institutional racism refers to how policies and practices either within or across institutions favor a specific group and disadvantages others. Structural racism involves a system of institutional practices, public policies, and belief systems creating structures of power for some and oppression for others.
Racist	Actions, measures, ideas, policies, etc. that produce and sustain that one racial group is superior to another racial group, thereby supporting systems of power and oppression that elevate some and oppress all others.

Vocabulary (cont.)

Term	Definition
Racist AI	Artificial intelligence (AI) is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment. Racist AI refers to the fact that the algorithms that underpin AI reflect the biases of their human programmers (due to the data input, the programming created). This means AI can have racist and biased results that perpetuate inequities in our society, economy, and culture.
Tía	"Aunt" in Spanish

Extension Activities: Algorithmic Bias and AI

The following activities explore artificial intelligence algorithmic bias. Some activities are expected to take at least two sessions or may be used as a hybrid activity with assigned video watching as homework followed by discussion the next day.

Activity	Estimated Time	Target Audience	Description
Byte of AI lessons by AIforAll Open Learning	1 hour	8th-12th or 13-18 yrs	This activity invites people to watch some or all of Coded Bias, a documentary film about Joy Buolamwini's research of algorithmic bias, and follow the discussion guide with questions and further resources.
Coded Bias Discussion Guide by PBS	2-3 1-hour sessions	8th-12th or 13-18 yrs	This activity invites people to watch some or all of Coded Bias, a documentary film about Joy Buolamwini's research of algorithmic bias, and discuss and learn more using the guide.
Part 1, Part 2, Part 3 Coded Bias Edpuzzle by Sharon Sangeleer	2-3 1-hour sessions	8th-12th or 13-18 yrs	The Coded Bias film is broken into three parts with embedded questions using the Edpuzzle platform.
Coded Bias Guided Questions	30 min	8th-12th or 13-18 yrs	Handout of comprehension and reflection questions about the Coded Bias film.

Extension Activities: Identity

The following curated activities about identity can be used to help learners reflect on themselves and get to know one another better.

Activity	Estimated Time	Target Audience	Description
"Who Am I?" - Developing identity and self-esteem by University of Michigan	45 min	7th-9th or 12-14 yrs	Students make a short presentation using some introduced text structures and language.This activity encourages students to create positive affirmations about their own ability and/ or characteristics.
"Who Am I?" Check-In & Warm-Up by University of Michigan	45 min	7th-12th or 12-18 yrs	This introductory activity can be used as a standalone or with the "Who Am I" lesson above as check-in or warm-up.
Personal Identity Wheel by University of Michigan	45 min	9th-12th or 14-18 yrs	This worksheet encourages learners to reflect on how they identify outside of social identifiers including skills, favorite books, hobbies, etc.

Additional Resources

- These videos feature scientists found in the *Power On!* graphic novel talking about their work regarding algorithmic bias and artificial intelligence:
  - *"The Quest for Ethical Artificial Intelligence"* talk by Timnit Gebru speaking at the Harvard Radcliffe Institute
  - *"Race After Technology"* talk by Ruha Benjamin at the Data & Society Research Institute
  - *"Algorithms of Oppression, A Conversation with Safiya Noble"* at the Thurgood Marshall Institute
  - *"The Era of Blind Faith in Big Data Must End"* TED talk by Cathy O'Neil
- For hands-on learning, Scratch (a free, online coding platform by MIT) has project ideas related to identity and self-expression such as Animate a Name and Create a Story. Google's CS First program also offers an Animate a Name project.


CHAPTER 2
SUMMERTIME

Chapter 2

Overview

In response to what happened with racist AI in Chapter 1, the four friends want to go to a Black Lives Matter (BLM) protest together. However, Christine gets grounded because of her bad grades in summer school. In order to join her friends at the rally, she lies to her mom about studying and goes to the protest anyway. She gets in trouble, but makes it through the summer with the support of her friends and family. All the friends go to Taylor's Juneteenth BBQ cookout and decide to help Christine study for her class. Then the friends get ready for their first day of high school.

Topics

- Gender Norms
- Home Life Struggles
- Identity, Culture, and Belonging
- Movements and Protests

Background

Chapter 2 describes a Black Lives Matter protest, Juneteenth, and gender stereotypes. We recommend facilitators prepare to engage learners with these topics by exploring some of the following resources beforehand:

- *The Black Lives Matter Movement* resource webpage by Howard University of Law
- *Civil Rights Movement* resource webpage by A+E History Channel
- *What is Juneteenth?* article by Elizabeth Nix from A+E History Channel (2 min)
- *Preparing for a Conversation about Policing and Racial Justice* educator resource by Facing History & Ourselves
- *It's Reigning Men: Gender Roles and How They Hurt You* TEDx Talk video by Lilia Fromm (7 min)

Objectives

Students will be able to at the end of this lesson…

- identify key plot points of the chapter
- define gender roles and gender expression and the impact they have on our lives
- identify algorithms in the world around them
- describe the purpose of *Juneteenth*

CSTA Standards

- **2-IC-20** Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- **2-IC-21** Discuss issues of bias and accessibility in the design of existing technologies.
- **3A-IC-24** Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
- **3A-IC-25** Test and refine computational artifacts to reduce bias and equity deficits.

Discussion Questions

1. What is a protest? What are some protests that you have heard about? Why do people protest?
2. What do you believe are the main reasons behind the BLM national protests?
3. Is lying always bad? Is there a time when lying is ok?
4. Taylor's family celebrates Juneteenth. What are some holiday's you and your family celebrate?
    a. Why are these celebrations important to you and your family or community?
    b. What types of activities or foods do you have at your celebrations?
5. Read the signs at the protest on page 18. Pick one and explain what it might mean.
6. Why do you think Christine's mom is proud of her even though she lied?
7. What does it mean to be proud of someone?
8. In this chapter we see Jon doing his nails and talking about doing makeup, two things that appear to go against traditional gender roles. Do you see gender roles playing a big role for young people today? Do you believe that gender roles should exist? Explain your answer.
9. Have you experienced starting at a new school or a new activity where you do not know many people? What does it feel like when you are the new kid?

**Student handout in Appendix*

Comprehension Questions

**Student handout and answer key in Appendix*

1. Where were the friends headed at the beginning of Chapter 2?
2. Why did the friends want to go to this protest?
3. Why did Christine lie about what she and her friends were doing?
4. How did Christine's mom respond to Christine lying and going to the protest?
5. What is Juneteenth and why is it important to remember?
6. What do Christine's friends agree to do for her?
7. What are some activities that we see Jon doing during this chapter?
8. Which friends are going to school together?

Vocabulary

Term	Definition
Juneteenth	Juneteenth commemorates the effective end of slavery in the United States. After the abolishment of slavery in the United States, white people refused to follow the new law and continued to keep African American people enslaved. African American enslaved people were denied access to information about their freedom and had no power to free themselves. Juneteenth (short for "June Nineteenth") marks the day when federal troops arrived in Galveston, Texas in 1865 to take control of the state and ensure that all enslaved people were freed.
Protest	A statement or action expressing disapproval of or objection to something.
BLM (Black Lives Matter)	BLM (as a movement) is a decentralized political and social movement that seeks to highlight racism, discrimination, and inequality experienced by Black and African American people. It was started by three Black women (Alicia Garza, Patrisse Cullors, and Opal Tometi), first on social media in response to the killing of innocent Black and African American people by both the police and non-Black people in the US. The movement began in protest to George Zimmerman's acquittal after shooting and killing Trayvon Martin in 2012. The movement continued to grow as more Black and African American people were murdered over the years.
Gender Roles	The role or behavior learned by a person as appropriate to their gender, determined by the prevailing cultural norms.
Gender Expression	The way in which a person expresses their gender identity, typically through their appearance, dress, and behavior.

Extension Activities: Algorithms in the World

The following activities are about recognizing algorithms in the world around us as a recipe and exploring algorithmic thinking through different cultural practices.

Activity	Estimated Time	Target Audience	Description
Algorithms of Food by Megan Bowen	30-45 min	6th-9th or 11-14 yrs	Utilize these slides to guide your learners in understanding how algorithms are like following a recipe.
Cultural Algorithms from Culturally Situated Design Tools	1-2 hours	9th-12th or 14-18 yrs	Select a Cultural Algorithm Lesson where learners can find the "heritage algorithms" of their interest, learn their connection to STEM principles, and develop designs of their own creation.

Extension Activities: Gender Norms

This collection of curated videos and activities to help lead conversations with your students around gender stereotypes.

Activity	Estimated Time	Target Audience	Description
Draw a Computer Scientist by Megan Bowen	30 min	6th-10th or 11-16 yrs	Ask learners to draw what a Computer Scientist looks like, name them, and be ready to explain what is happening in the drawing. Also consider doing the activity with your students. You may do this activity digitally, creating an opportunity to discuss pixels and hexadecimal colors (e.g., What options are available to use for skin color?) or do a Google image search of "computer scientist" and see what comes up.
Gender Roles and Gender Stereotypes videos	10 min	1st-3rd or 6-8 yrs	Choose one or both of the videos by UpWorthy and European Institute for Gender Equality and follow up with by asking learners what surprised them.
That's a (Gender) Stereotype! by GLSEN	40 min	8th-12th or 13-18 yrs	Utilize the activity guide to help learners identify stereotypes
Challenge Gender Stereotypes videos	20 min	8th-12th or 13-18 yrs	Play video for high school (please be aware there is some adult language) or middle school students related to challenging gender stereotypes and discuss afterwards.

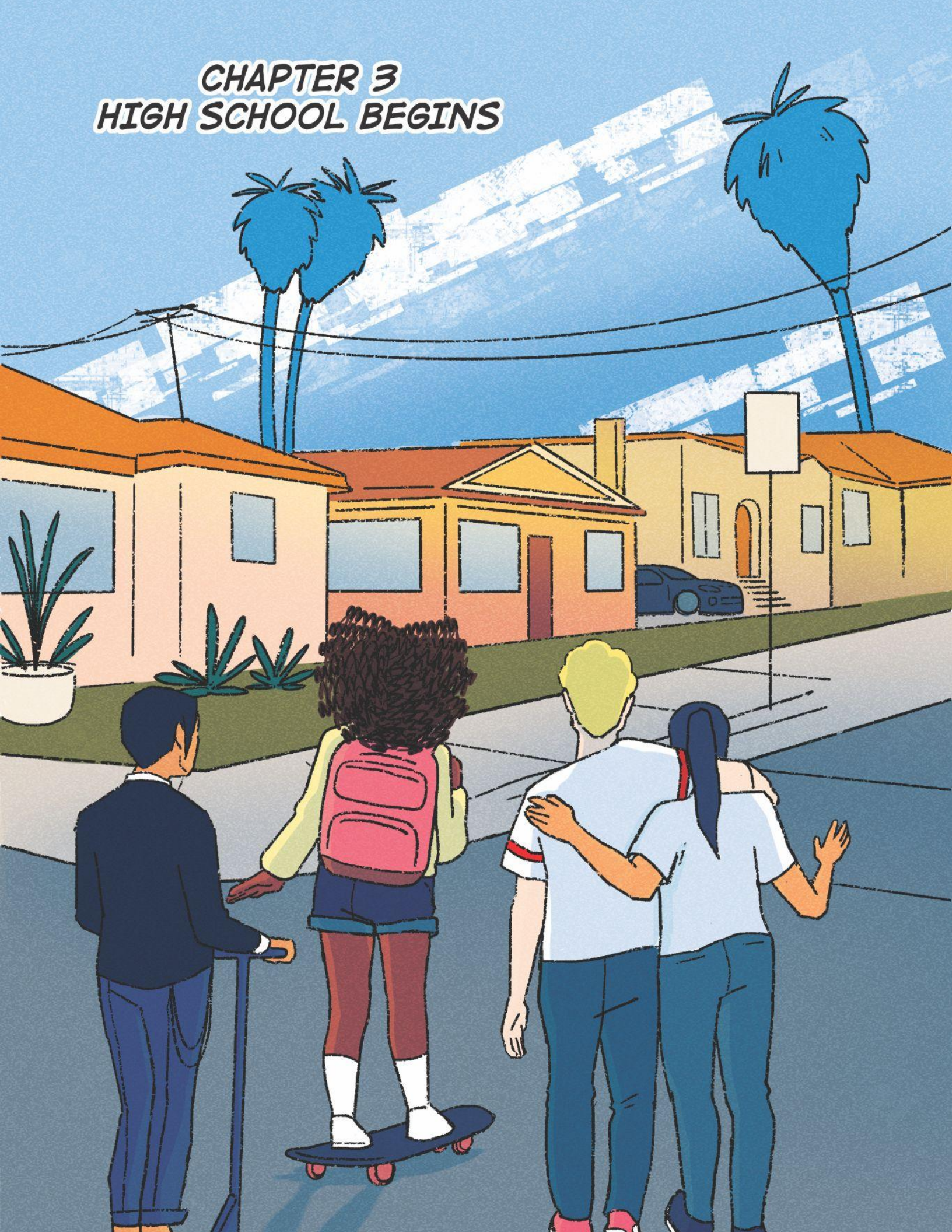
Extension Activities: Movements and Protests

The following activities are about recognizing algorithms in the world around us as a recipe and exploring algorithmic thinking through different cultural practices.

Activity	Estimated Time	Target Audience	Description
Black Lives Matter Protests by BrainPop	30 min	6th-10th or 11-16 yrs	Use the BrainPop resources (sign in required) to guide students through having conversations about the Black Lives Matter Movement.

Additional Resources

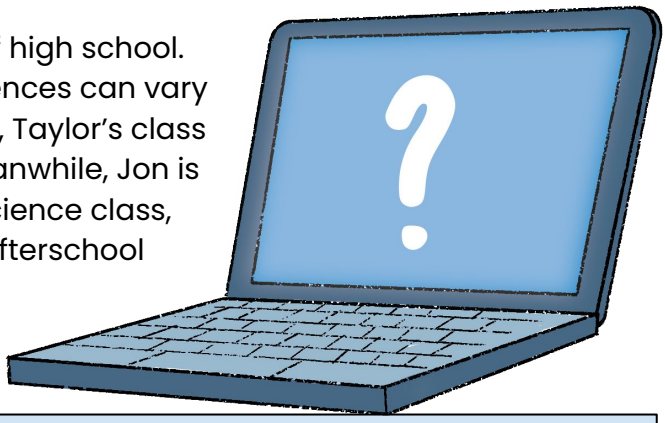
- *Why is Juneteenth important?* article by The National Museum of African American History and Culture (4 min)
- *Black Lives Matter, the Killing of George Floyd, and the Long Fight for Racial Justice* lesson plan by the Choices Program at Brown University
- *LGBTQ History and Why It Matters* 50-min lesson plan by Facing History
- *Unheard Voices: Stories of LGBT History* lesson plans from Anti-Defamation League


CHAPTER 3
HIGH SCHOOL BEGINS

Chapter 3

Overview

In this chapter, the four friends attend their first day of high school. They discover that computer science learning experiences can vary widely; while Antonio learns about AI and surveillance, Taylor's class is "just typing" and Jon finds his teacher is boring. Meanwhile, Jon is bullied and Christine gets tracked out of Computer Science class, but her English teacher helps her find an alternative afterschool option. Pages 44-45 define CS and describe its widespread usage and impact in society.



Topics

- Bullying and Microaggressions
- Careers with Tech
- Home Life Struggles
- How to Be an Ally
- Identity, Culture, and Belonging
- Stereotypes of Who Does CS
- Technology for Good or Harm
- Tracking in Schools
- Undocumented Immigrants
- Underrepresentation in CS and Its Impact

Background

Chapter 2 delves into issues of stereotypes, microagressions, and allyship. We recommend facilitators explore the following resources beforehand to familiarize themselves with these topics:

- *Microaggressions in the Classroom* article by Rick Wormeli from Association for Middle Level Education (12 min)
- *Anatomy of an Ally* article by Carrie Gaffney from Learning for Justice (8 min)
- *2021 State of CS* article and report on K-12 CS education across the U.S. by Code.org (8 min)

Objectives

Students will be able to at the end of this lesson…

- define *Computer Science*.
- describe how Computer Science is changing different industries.
- define *bullying* and *microaggressions* and the impact they have on students' school experiences.
- identify instances of and opportunities for allyship.

CSTA Standards

- **2-IC-20** Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- **2-IC-21** Discuss issues of bias and accessibility in the design of existing technologies.
- **3A-IC-24** Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
- **3A-IC-25** Test and refine computational artifacts to reduce bias and equity deficits.

Discussion Questions

1. Have you ever avoided a school function or extracurricular activity because you felt unsafe or uncomfortable?
2. What do you think the counselor meant when she said, "You're in 'Hospitality and Tourism' class during period 4. Isn't that a better fit for you?
3. What are current day gender stereotypes and how are they related to the statistics of who studies CS?
4. Think of a time you felt underestimated. Why do you think it happened, and how did you respond to it?
5. Throughout the chapter, different characters step up in different ways to support each other. List all the ways you see allyship. Think of a time when you needed support or when you gave support to someone who needed it. What was that experience like?
6. Before this class/lesson, what did you think computer science was? How has your perception of CS changed since this class? Since this graphic novel?
7. How has computer science affected your life? Think of all the different ways.
8. What do you think are the pros and cons and threats of technology to our privacy?

**Student handout in Appendix*

Comprehension Questions

**Student handout and answer key in Appendix*

1. What happened to Jon and Taylor in their classes? How were their experiences similar? How were they different?
2. Why do many LGBTQ+ students avoid school functions and extracurricular activities?
3. How more likely are LGBTQ+ students to be bullied on school property or cyberbullied compared to their heterosexual peers?
4. What 4 LGBTQ+ resources were listed?
5. How do the characters respond when they realize they are getting different educational experiences?
6. What does Antonio's Intro to CS teacher do that's made a positive impression on him?
7. What is Christine concerned about the impact of info being tracked on phones and the internet?
8. About how many undocument immigrants live in the U.S.?
9. What is computer science?
10. How is CS changing different fields? (i.e. entertainment, health care, sports, education, fashion, climate change, space exploration, etc.)
11. What was the counselor's response when Christine requested to enroll into the Intro to Computer Science course?
12. What was Christine's reaction to the visit to the counselor?
13. How did Christine's teacher help Christine process her upsetting visit to the counselor?
14. How did Christine's teacher learn about the new coding club for girls only?

Vocabulary

Term	Definition
Bias	Prejudice in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair.
Gender-Expansive	An umbrella term sometimes used to describe people who expand notions of gender expression and identity beyond perceived or expected societal gender norms. Some gender-expansive individuals identify as a mix of genders, some identify more binarily as a man or a woman, and some identify as no gender (agender). Gender-expansive people might feel that they exist among genders, as on a spectrum, or beyond the notion of the man/woman binary paradigm. Sometimes gender-expansive people use gender-neutral pronouns (such as they/them), but people can exist as any gender while using any pronouns. They may or may not be comfortable with their bodies as they are, regardless of how they express their gender.
ICE	ICE stands for Immigration and Customs Enforcement, an agency within the Department of Homeland Security. ICE was created in 2003, as a part of the government's reorganization after the Sept. 11, 2001, attacks.

Vocabulary (cont.)

Term	Definition
M'hija	A term of endearment that means "my daughter" in Spanish. It is often used in an affectionate/friendly way between people who are not related to one another.
Microaggression	The everyday slights, indignities, put downs and insults that people of color, women and non-binary people, LGBT populations or those who are marginalized experience in their day-to-day interactions with people.
Prejudice	Preconceived notions that are not based on actual experience or reason.
Racist AI	Artificial intelligence (AI) is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment. Racist AI refers to the fact that the algorithms that underpin AI reflect the biases of their human programmers (due to the data input, the programming created). This means AI can have racist and biased results that perpetuate inequities in our society, economy, and culture.
Stereotype	A widely held but fixed and oversimplified image or idea of a particular type of person or thing
Surveillance	The monitoring of behavior, many activities, or information for the purpose of information gathering, influencing, managing or directing. Surveillance is historically associated with monitoring criminal activity, but is increasingly directed at the general public.
Undocumented	Refers to anyone residing in any given country without legal documentation. It includes people who entered the U.S. without inspection and governmental permission, and those who entered with a visa that is no longer valid.

Extension Activities: Artificial Intelligence

The aim of this unit is to demystify the topic of AI, with students gaining an understanding of AI-associated terminology while considering the social, moral, and ethical impacts of AI systems and usage.

Activity	Estimated Time	Target Audience	Description
Artificial Intelligence Unit by Exploring CS	1 day (or 20 days for the full unit)	9th-12th or 14-18 yrs	Use the activity on pages 18-23, "Areas that AI is changing". This 1-day lesson will get students to delve further into areas that AI is changing, including agriculture, shopping, medical diagnosis, sport, and more.

Extension Activities: Technology for Good or Harm

This activity allows learners to consider issues of cybersecurity, data, and privacy in relation to their personal technology practices.

Activity	Estimated Time	Target Audience	Description
Internet Privacy Checkup by John R. Sowash	1-2 hours	9th-12th or 14-18 yrs	The choice board contains 10 different security tasks that will help you review and secure your digital information. This activity is designed for high school students who have Google, Facebook, Snapchat, and other social media accounts. You may choose to include a reflection activity to provide students a chance to share what they discovered. You can make a copy of the choice board template.
The Big Data Dilemma by Common Sense Media	50 min	9th-12th or 14-18 yrs	Many of us are aware that we're being tracked when we go online. It's one of the ways our favorite websites and apps know how to recommend content just for us. But how much information are companies actually collecting? And what are they doing with it? Digging into the details can help us make smart decisions about our online privacy and how to protect it.

Additional Resources

- Further reading about in tracking practices in schools:
  - *A Critical Examination of Tracking as a Method for Maintaining Racial Segregation* literature review by Tom McCardle published in the Educational Considerations journal (pages 8-12 recommended, 14 min)
  - *Modern-Day Segregation in Public Schools* article by Sonali Kohli and Quartz from The Atlantic (12 min)
- Educators and students and read more about the state of CS education and look up your state's statistics on *Code.org's advocacy webpage*.
- For more examples of careers in tech, see *Women in Tech Spotlight: The Kate Spade & Company Foundation* feature article from Girls Who Code (4 min)


CHAPTER 4
WHY DO WE NEED TO LEARN COMPUTER SCIENCE?

Chapter 4

Overview

This chapter follows the four friends' lives during their first semester of high school. It shows the friends having different experiences in their respective CS courses (in and out of school) and how they encounter allies, deal with home life struggles, and study for exams. The chapter describes Antonio attending a field trip to discover CS careers where he also learns about algorithmic bias in healthcare. The chapter ends by featuring the work of prominent researchers Cathy O'Neil, Ruha Benjamin, Safiya Noble, and Virginia Eubanks who investigate the harm technology can cause.

Topics

- Algorithmic Bias and Artificial Intelligence
- Careers with Tech
- CS Heroes
- Home Life Struggles
- How to be an Ally
- Stereotypes of Who Does CS
- Technology for Good or Harm
- Underrepresentation in CS and Its Impact

Background

Topics raised in Chapter 4 include allyship, bias in computing and AI, and harmful technology. We recommend facilitators prepare to engage learners with these topics by exploring some of the following resources beforehand:

- *How to Be an Ally* professional development resource by League for Justice
- *How to be an Ally* professional development resource by PBS Learning Media
- *Weapons of Math Destruction* book by Cathy O'Neil's or her TED Talk video (13 min)
- *Race after Technology* book by Ruha Benjamin or watch her talk from the Data & Society Research Institute (51 min)
- *Algorithms of Oppression* book by Safiya Noble or watch her talk from Personal Democracy Forum (12 min)
- *Automating Inequality* book by Virginia Eubanks or read or listen to her interview on Marketplace (10 min)

Objectives

Students will be able to at the end of this lesson…

- identify various roles (tech/non-tech) in CS and technology.
- compare and contrast the friends' experiences in their CS courses.
- explain what it means to be an "ally."
- use tools and methods for collaboration on a project to increase connectivity of people in different cultures and career fields.

CSTA Standards

- **2-IC-20** Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- **2-IC-21** Discuss issues of bias and accessibility in the design of existing technologies.
- **3A-IC-24** Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
- **3A-IC-25** Test and refine computational artifacts to reduce bias and equity deficits.

Discussion Questions

1. Antonio uses music to cope/deal with the issues at home. What are ways that you manage stressful situations?
2. Taylor's Computer teacher confuses Taylor and Janelle (the only 2 African-American young women students in the class). Has this ever happened to you? What do you think Taylor and Janelle should do to correct the teacher?
3. Antonio's father has left the home and it is now his older brother, mom, and him living in the home. This is a form of separation/loss.
    a. Have you ever experienced loss in your life?
    b. What was Antonio and his brother's solution to assisting mom with the household finances?
    c. How do you help support your family and/or community, either financially or emotionally or in daily chores?
4. What are some CS/technology integrations that impact the medical industry?
5. Why do you think that most of the Game Company employees were white males?
6. Does the fact that the tech industry is mostly white males motivate you or discourage you from taking an interest in CS? Do you feel like you would fit in?
7. How is computer science involved in the jobs that you are interested in?

**Student handout in Appendix*

Comprehension Questions

**Student handout and answer key in Appendix*

1. Since Christine was unable to be enrolled in the Computer Science class, what did she do as an alternative to learn more about computer science?
2. Christine is feeling pressure from her parents about her grades. Why do you think her parents are concerned about her education and grades?
3. Jon has a new ally in his Computer Science class. What do you think the role of an ally is?
4. During Antonio's class field trip at the Game Design company, not everyone was a computer scientist. What were other positions that were part of the company's team?
5. Why did one of the students make the comment, "I do not want to be in game design, because no one looked like me"?
6. Why did Antonio's teacher, Mrs. Martinez, choose to teach computer science?
7. If a student wanted to be a nurse, why would it be important for that student to learn computer science?
8. Which four women authors are listed? How does their writing shed light on issues within computer science?

Vocabulary

Term	Definition
Algorithm	A process or set of rules to be followed in calculating other problem-solving operations, especially by a computer.
Algorithmic Bias	An algorithm created by humans that has embedded within it the values and inclinations both for and against certain groups, characteristics, cultures, beliefs, etc.
Ally	Being in support and association with another person or group, especially people and groups that are being oppressed and marginalized.
Bias	Prejudice in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair
Socioeconomic Status	Referring to one's social standing or class based on one's financial status, education, and occupation.

Extension Activities: Algorithmic Bias and AI

The following activities are about recognizing and reflecting on algorithmic biases in the world around us. Also included are videos to dive deeper into the work of the scientists featured in Chapter 4: Cathy O'Neil, Ruha Benjamin, Safiya Umoja Noble, Virginia Eubanks.

Activity	Estimated Time	Target Audience	Description
Racial Bias in Healthcare infographic by National Institute for Health Care Management (NIHCM) Foundation	45 mi	10th-12th or 15-18 yrs	The infographic displays the bias in healthcare through the use of algorithms. This can be used as a discussion with the class.
AI Lesson Plan about bias by Casey Day	45 min	7th-9th or 12-14 yrs	Partner/Group Actvity - Share with students an overview of how the Google algorithm works. Is the algorithm inherently racist/biased? If not, then how does this happen.
Algorithmic Bias Lesson by Code.org	45 min	10th-12th or 15-18 yrs	In this lesson, students will work on cropping images and discuss the challenges and bias involved in teaching a machine how to crop an image.
Power On! Chapter 4 Featured Scientists	45 min	7th-12th or 12-18 yrs	Learn more about the work of the researchers featured in Chapter 4 by watching a talk by them: • Cathy O'Neil's TED Talk video (13 min) • Ruha Benjamin's or talk from the Data & Society Research Institute (51 min) • Safiya Noble's talk from Personal Democracy Forum (12 min) • Virginia Eubanks' interview on Marketplace (10 min)

Extension Activities: Careers with Tech

Learners consider different careers that use technology from a practical perspective.

Activity	Estimated Time	Target Audience	Description
Exploring Technology Careers by The National Center for Quality Afterschool	2 -3 1-hour sessions	6th-12th or 11-18 yrs	In this lesson, students consider how technology is used in the workplace. Through a series of group and individual activities, they assess their skills and interests, identify their "perfect" job or career, and research the role technology plays in that job or career. The lesson helps students begin to think about how their education can help them prepare to meet their career goals.
Careers in Computer Science from StudyLib	180 minutes	6th - 12th	In pairs, students will select a career and prepare describing the job, salary, education required, and working conditions for the career. Posters will be displayed on the classroom walls.

Extension Activities: How to Be an Ally

These resources help learners recognize ways of being an ally by exploring different situations and strategies.

Activity	Estimated Time	Target Audience	Description
Making Decisions: Ally or Bystander from Welcoming Schools by The Human Rights Campaign Foundation	45 min	3rd - 8th or 8-13 years	In this lesson, students take the time to explore many different situations that could be seen at school and think about how they make decisions around allyship, such as speaking up in the moment, getting help from a caring adult, talking to the person in private or walking away. This activity can be done multiple times using different situations to increase your student's ability to be an ally
Allyship learning resources by Learning for Justice	45 min	Depends on activity	Browse this collection of learning plans focused on learning about allyship and how to be an ally.

Additional Resources

- If you are interested in starting a Club like the one that Christine participated in, Girls Who Code provides free resources to support after school coding Clubs, including a one-of-a-kind curriculum that includes Women in Tech Spotlights, self-guided tutorials, interactive activities, flexible meeting guides, and more! Girls Who Code also offers free, virtual summer programs to teach the computer science skills that students need to make an impact in their community while preparing for a career in tech. Students get exposure to tech jobs, meet women in tech careers, and join a supportive sisterhood.
- In this talk video hosted by Schomburg Center for Research in Black Culture, Bettina Love, author of "We Want to Do More Than Survive", explains the difference between an ally and a co-conspirator.
- CSforALL is an organization dedicated to make high-quality CS fundamental to K-12 education. Their website at csforall.org has links and resources for educators, out-of-school time programs, curriculum providers, administrators, funders, students, and families.

CHAPTER 5
SOMEONE LIKE ME

Chapter 5

Overview

In this chapter, the friends share and discuss the different experiences they are having in their CS classes in school and afterschool programs and how it relates to underrepresentation in CS. The discussion brings up key points and resources such as Computer Science for All, Sammy Lee, and Stuck in the Shallow End. The friends discover prominent computer scientists that are part of underrepresented groups. These CS heroes are described in further detail at the end of the chapter.

Topics

- Careers with Tech
- CS Heroes
- Gender Norms
- Identity, Culture, and Belonging
- Movements and Protests
- Segregation
- Socioeconomic Inequality
- Stereotypes of Who Does CS?
- Undocumented Immigrants
- Underrepresentation in CS and Its Impact

Background

We recommend facilitators explore the following resources beforehand to familiarize themselves with the main themes included in this chapter in order to prepare for engaging with learners around these topics:

- CSforAll website devoted to making Computer Science accessible for all.
- *How I'm fighting bias in algorithms* TED talk by Joy Buolamwini (9 min)
- *Stuck in the Shallow End* book Introduction and Chapter 1, written by *Power On!* co-author Jane Margolis with Rachel Estrella, Joanna Goode, Jennifer Jellison Holme and Kimberly Nao.
- *Intersectionality, More than Two Decades Later* interview with Kimberlé Crenshaw by Columbia Law School

Objectives

Students will be able to
at the end of this lesson...

- Identify multiple ways in which people can contribute to the field of CS
- identify people who study CS and explain their intersectional identities
- describe the ways women, nonbinary people, and Black, Brown, Indigenous/Native, and other People of Color have been intentionally denied opportunities to participate and excel in CS as a result of segregation
- understand that CS learning is not a zero-sum game: All people should have access to it, and one person learning CS doesn't mean others will learn less.

CSTA Standards

- **2-IC-20** Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- **2-IC-21** Discuss issues of bias and accessibility in the design of existing technologies.
- **2-IC-22** Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact.
- **3A-IC-24** Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
- **3A-IC-25** Test and refine computational artifacts to reduce bias and equity deficits.

Discussion Questions

1. On page 72, the friends are discussing how their teachers address or ignore race/ethnicity in the classroom. Why is it important to address race/ethnicity in school settings? What do you wish teachers would discuss in relation to race/ethnicity?
2. On page 73, the group talks about barriers to computer science education. Can you think of other ways computer science may not be accessible?
3. On page 76, the friends are discussing how a lack of access led to a disparity for Black swimmers. What contributed to those barriers? How is this relevant to computer science education and careers in technology?
4. The friends joke about Christine pursuing diving because she is half Korean, and also discuss the stereotypes that shaped Taylor's family's experience with swimming. Have people ever teased you or treated you differently based on stereotypes? Were there times when this made you laugh, and other times when you felt upset?
5. From pages 78 to 82, we encounter eleven different figures in computer science. Which person did you most relate to? Why?
6. Did any of these people stand out to you? What about them did you find most interesting? Why?
7. Choose one of the people discussed in this chapter and identify the different layers of their intersectional identity. Intersectionality is the way in which different identities collide and work together. For instance, someone may be Black, a girl, and queer. These identities all describe a person, and alter how they experience the world. How might these different aspects of identity affect their access to computer science?

**Student handout in Appendix*

Comprehension Questions

**Student handout and answer key in Appendix*

1. List the ways that the group discusses as to why students may lack access to computer science education.
2. Who was Anthony Evans?
3. What laws made swimming pools segregated?
4. What was Katherine Johnson's job at NASA?
5. What kind of research does Joy Buolamwini conduct?
6. What is the goal of Tristan Walker's nonprofit Code2040?
7. Why did Laura Gomez switch her major in college?
8. What two organizations did Rediet Abebe co-found?
9. What team was Chanpory Rith a part of at Google?
10. What was Timnit Gebru critical of at Google?
11. Why did IBM fire Lynn Conway?
12. What kind of company is Farida Bedwei's Logiciel?
13. How did Erin Ishimoticha (previously Erin Spiceland) learn computer science?
14. What does Joshua Miele's Tactile Maps Automated Production make?

Vocabulary

Term	Definition
Adaptive Technology	Special versions of already existing technologies or tools that provide enhancements or different ways of interacting with the technology to allow individuals with a disability or impairment to accomplish a specific task
Algorithmic Bias	AI that makes decisions that are systematically unfair to certain groups of people.
Bigotry	Strong beliefs and opinions rooted in prejudice against specific people or groups of people based on their identity and group membership.
Heterosexism	Discrimination or prejudice against gay people on the assumption that heterosexuality is the "normal" sexual orientation
Homophobia	Dislike and prejudice against gay people
Interdisciplinary	Relating to more than one branch of knowledge
Jim Crow Laws	Laws created in Southern states to enforce racial segregation and discrimination against non-white people, especially Black and African American communities.
Minoritize	To make (a person or group) subordinate in status to a more dominant group or its members: For example: Though women constitute a majority of employees, they are routinely minoritized, passed over for promotion, and poorly represented in authority positions.

Vocabulary (cont.)

Term	Definition
Psychoacoustics	Psychoacoustics combines the study of acoustics and auditory physiology to determine the relationship between a sound's characteristics and the auditory sensation that it provokes.
Segregated	Divided by race/ethnicity, often meaning only white people had access to certain resources
Socioeconomic Inequality	Ways in which social class, education and/or household income vary widely across groups of people and how it then affects those groups
Stereotypes	A widely held but fixed and oversimplified image or idea of a particular type of person or thing
Transgender	Denoting or relating to a person whose sense of personal identity and gender does not correspond with the sex they were assigned at birth
Transphobia	Dislike and prejudice against transgender people.

Extension Activities: CS Heroes and Intersectionality

This activity invites learners to be inspired by "CS Heroes" either from *Power On!* Chapter 5 or from CSEdWeek.

Activity	Estimated Time	Target Audience	Description
Power On! Chapter 5 CS Heroes Deep Dive	2-3 1-hour sessions	6th-12th or 11-18 yrs	Choose one of the eleven figures covered within Chapter 5: Katherine Johnson, Joy Buolamwini, Tristan Walker, Laura Gomez, Rediet Abebe, Chanpory Rith, Timnit Gebru, Lynn Conway, Farida Bedwei, Erin Ishimoticha (previously Spiceland), Joshua Miele. Create a slide presentation on them to share more about their lives with the class. Choose to focus on: their early lives, their identity and the different intersections, their research, their careers, the obstacles they faced, and the ways they worked through these obstacles.
CS Heroes Poster Lesson from CSEdWeek 2021	45 min	6th-12th or 11-18 yrs	Students will expand their knowledge of the relationship that CS has with different industries by exploring the CS Heroes, how their work integrates with other industries, and the positive impact the CS Heroes' contributions have on the lives of others.

Extension Activities: Underrepresentation in CS and Its Impact

The following activity examines how systemic barriers and social and psychological factors contribute to inequitable access, engagement, and achievement in CS among marginalized groups.

Activity	Estimated Time	Target Audience	Description
Title IX History and Computing Comparisons by Sarah Ciras, CSTA Equity Fellow	45 min	4th-12th or 9-18 yrs	*Power On!* Chapter 5 discusses the ways in which athletics have struggled to find equitable and inclusive solutions for differing identities. Watch this video on Title IX and consider the ways in which these rules of Proportionality, Progress and Satisfied Interest might connect to the way access to computing education is handled in schools today since Obama's CSforAll initiative. Then, check out these resources from Code.org to find data on CS programs in your state.

Additional Resources

- The Sum of Us New York Times bestseller book by Heather McGhee is about how life can be more than a zero-sum game.
- CS Pioneers posters celebrating diversity in CS from Teaching London Computing

CHAPTER 6
WE ARE THE CHANGE WE WANT

Chapter 6

Overview

In this chapter, the friends support and help each other learn CS in their free time, share about projects they are making, and encourage Christine when she presents about her project at an open event for her after school club. Christine, in turn, displays a project that shows how she is supporting her friends, community, and family through her own form of allyship. The friends are inspired by their shared experiences and the desire to make sure all students have access to CS. They decide to use their voices to bring CS to all youth.

Topics

- Bullying and Microaggressions
- Home Life Struggles
- How to Be an Ally
- Identity, Culture, and Belonging
- Movements and Protests
- Socioeconomic Inequality
- Stereotypes of Who Does CS
- Underrepresentation in CS and Its Impact
- What is "Good Trouble"?
- Youth Voice and Agency

Background

Chapter 6 introduces the concept of "good trouble". We recommend facilitators prepare to engage learners with these topics by exploring some of the following resources beforehand:

- *Five things John Lewis taught us about getting in "good trouble"* article by Rashawn Ray from the Brookings Institution (4 min)
- *John Lewis: Good Trouble* documentary film website
- *6 Youth-Led Political Movements to Inspire You to Vote* article by Common Sense Media
- *What Is Youth Participatory Action Research (YPAR) and How Does It Relate to Civics?* from Civic Educator

Objectives

Students will be able to at the end of this lesson…

- define *e-textiles*.
- identify examples of allyship and taking collaborative action.
- critique the lack of diversity in the CS industry.
- defend the importance of access to computing classes for ALL students.

CSTA Standards

- **2-IC-20** Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- **2-IC-21** Discuss issues of bias and accessibility in the design of existing technologies.
- **2-IC-22** Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact.
- **3A-IC-24** Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
- **3A-IC-25** Test and refine computational artifacts to reduce bias and equity deficits.

Discussion Questions

1. Why do you think Christine reacted the way she did after Antonio asked how her project was computer science?
2. What does “good trouble” mean to you?
3. Christine was nervous to formally present her project to others. What are ways that you prepare for moments that make you nervous?
4. What is a project you have made in your life that you are proud of? What did you make and why?
5. What are examples of adult-ism in this chapter?
6. Have there been issues in your school where you feel the students were not listened to? If so, describe those scenarios.
7. When are moments when you feel like you have taken a stand for something you believe in, whether in everyday small ways in your life or in bigger ways like Christine’s presentation or the friends’ decision to present to the School Board?

**Student handout in Appendix*

Comprehension Questions

**Student handout and answer key in Appendix*

1. What's the name of the restaurant that the four students hang out at?
2. What type of work does Antonio do?
3. Why does Antonio work a lot?
4. What's the name of the place that Antonio works at?
5. What projects are Christine, Jon and Taylor working on?
6. How does Christine's light-up banner work?
7. What other projects were shared at Christine's club's presentation?
8. Who coined the term "good trouble"? What did this person mean by this idea?
9. How does Christine explain "good trouble" in her presentation?
10. Who helped Christine sew the banner?
11. What were Mr. Russell's reasons for forming the Young Women's Computer Science Club?
12. What motivates the four friends to take action towards increasing access to Computer Science?
13. Why did the group decide to wait and present to the school board in the Fall instead of organizing a presentation immediately?

Vocabulary

Term	Definition
Adultism	Prejudice and discrimination against young people
Avatar	an electronic image that represents and is manipulated by a computer user (as in a computer game)
Conductive Thread	Thread that conducts electricity
Electronic-Textile/ E-Textile	Fabric that enables electronic components such as batteries, lights, sensors, and microcontrollers to be embedded in them
Emo	A person who is overly sensitive, emotional, and full of angst, or who adopts a certain style characterized by dyed black hair, tight t-shirts and skinny jeans, etc.
"Good Trouble"	The kind of trouble you can be proud of, a term used by civil rights icon John Lewis, to mean standing up to authority for what you believe in
Halmonee	"Grandmother" in Korean
Microcomputer	An electronic device with a microprocessor as its central processing unit (CPU)
Microcontroller	A small computer on a single metal-oxide-semiconductor (MOS) integrated circuit (IC) chip
¡Qué buena onda!	"Beautiful work" in Salvadoran Spanish

Vocabulary (cont.)

Term	Definition
¡Qué chiva!	"That's cool" in Salvadoran Spanish
"Redeem the soul of America"	Moral and spiritual transformation of the nation
Senile Punk	Sarcastic and ableist put-down that Christine says to make fun of the fact that her "emo" (not "punk") friend cannot remember something she told him in the past and is therefore senile
Sugohaesseo	"Good job, you worked hard" in Korean
Tía	"Aunt" in Spanish
Words of Affirmation	Positive words and phrases that communicate your love, appreciation, and respect for another person; used to uplift someone

Extension Activities: Electronic Textiles

The following open-ended, hands-on e-textile projects activities are from Stitching the Loop: An Electronic Textiles Unit in Exploring Computer Science which includes four introductory projects and four additional intermediate level modules for creating e-textile artifacts use high and low-tech materials while exploring computational concepts.

Activity	Estimated Time	Target Audience	Description
Paper Circuit	1-2 hours	9th-12th or 14-18 yrs	Create a simple paper circuit greeting card that includes one LED. Introduce the concept of aesthetic design and personalization.
Wristband	5-6 hours	9th-12th or 14-18 yrs	Create a wristband with three LEDs in parallel and a switch that turns on the project when the ends of the wristband are snapped together.
Collaborative Mural	10 hours	9th-12th or 14-18 yrs	As a class, create a mural, with each panel made by two students. Each panel must have five independently programmable LEDs and two switches, allowing for four blinking light patterns.
Human Sensors	10-14 hours	9th-12th or 14-18 yrs	Create a project with two aluminum foil patches that act as a sensor when both are touched by a person. Program four+ lighting patterns based on different sensor readings.

Extension Activities: What is "Good Trouble"?

This activity will help learners develop a better understanding of how the activists of the Civil Rights Movement challenged the norms, policies, and legislation that existed to lead to a change in society.

Activity	Estimated Time	Target Audience	Description
Minecraft Lessons in Good Trouble by Microsoft	Varies	3rd-12th or 8-18 yrs	Join US Civil Rights Movement activists as they march, ride, sit, and stand while being catalysts for Good Trouble, racial justice, and equality.

Extension Activities: Bullying and Microaggressions

This activity provides an opportunity to explore what microaggressions are, experiences with them, and what can be done to counteract them.

Activity	Estimated Time	Target Audience	Description
Microaggressions In Our Lives by Anti-Defamation League	45-60 min	9th-12th or 14-18 yrs	This lesson describes what microaggressions are through videos and photos and invites learners to reflect on their experiences through discussion, reading, and writing prompts.

Additional Resources

- *March* is an autobiographical graphic novel trilogy about the Civil rights movement, told through the perspective of "Good Trouble" John Lewis, civil rights leader and U.S. Congressman.
- The League for Justice has an article about the *Anatomy of an Ally* and professional development resources on *How to Be an Ally*.
- The *Why Diversity Is Important In Computer Science* webpage includes responses to questions and videos regarding diversity in CS.


CHAPTER 7
STUDENTS TAKE LEAD:
COMPUTER SCIENCE
FOR ALL

Chapter 7

Overview

In the last chapter, the friends prepare to present to the school board about why all youth should have access to high quality CS learning. They gather data, conduct interviews, create a website, and organize others. The friends work collaboratively and discuss their plans and the potential impact of the information they collected from multiple sources and targeted audiences.

Topics

- Algorithmic Bias and Artificial Intelligence
- Gender Norms
- Home Life Struggles
- How to Be an Ally
- Movements and Protests
- Stereotypes of Who Does CS
- Technology for Good or Harm
- Underrepresentation in CS and its Impact
- What is "Good Trouble"?
- Youth Voice and Agency

Background

Chapter 7 focuses on youth voice, agency, and advocacy. We recommend facilitators prepare to engage learners with these topics by exploring some of the following resources beforehand:

- *Part 1: What Do You Mean When You Say "Student Agency"?* from Education Reimagined by Jennifer Davis Poon
- *Everything You Need to Know About Student Agency* Knowre blog post by Sam Cressman
- Youth Advocacy resources by Advocates for Youth

Objectives

Students will be able to at the end of this lesson...

- discuss data points (like those the friends will discuss at the school board meeting).
- describe how to take a collaborative action.
- define the importance of access to computing classes for ALL students.
- identify instances of and opportunities for allyship.

CSTA Standards

- **2-IC-20** Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- **2-IC-21** Discuss issues of bias and accessibility in the design of existing technologies.
- **2-IC-22** Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact.
- **3A-IC-24** Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
- **3A-IC-25** Test and refine computational artifacts to reduce bias and equity deficits.
- **3A-IC-27** Use tools and methods for collaboration on a project to increase connectivity of people in different cultures and career fields.

Discussion Questions

1. Who are some people that you think are making "good trouble"? Why?
2. Why do you think not all students get to take CS classes? Why do you think only certain schools have CS classes?
3. How do you think computer science classes in your school could impact your community? You? Other students?
4. Do you think the students' voices will be heard or respected in the school board meeting? Why?
5. What is your superpower as a student?
6. Who takes CS in your school? Do you see patterns in who takes, or who has access to, CS in your school? How is this tied to larger issues in your school?
7. Have you ever taken action on something important to you? If yes, what did you do and why? If not, what is an issue you would want to discuss with your school board or community and why?

**Student handout in Appendix*

Comprehension Questions

**Student handout and answer key in Appendix*

1. What are the possible solutions the students are taking to the school board?
2. Where do they plan to collect data from? How do they plan to share the data with the school board? Provide examples.
3. What is their plan for protecting student privacy when sharing other students' stories with the school board?
4. What did Antonio create as his own contribution to helping people? What is the purpose of his project?
5. What are the reasons why Taylor believes it is important to talk to the School Board about CS Education? Provide at least 2 examples.

Vocabulary

Term	Definition
Advocacy	The act or process of writing or speaking in favor or, or supporting, a cause
Agency	Capacity and inclination to act on something and use one's own power to do so
Anonymously	Something that is done without attribution to its do-er/creator
App	An application or "app" for short is a computer software or program, often used on smartphones but also other types of computers
Data	In computing specifically, data refer to information, quantities, symbols, or characters that can be stored and shared by computers, then used for making references and calculating analyses
Good Trouble	The kind of trouble you can be proud of, a term used by civil rights icon John Lewis, to mean standing up to authority for what you believe in.
Juneteenth	Juneteenth commemorates the effective end of slavery in the United States. After the abolishment of slavery in the United States, white people refused to follow the new law and continued to keep African American people enslaved. African American enslaved people were denied access to information about their freedom and had no power to free themselves. Juneteenth (short for "June Nineteenth") marks the day when federal troops arrived in Galveston, Texas in 1865 to take control of the state and ensure that all enslaved people were freed.
Muchas Gracias	"Thank you very much" in Spanish
Pie Chart	A type of graph in which a circle, representing 100% or the entirety of something, is broken up into slices that represent portions of that entirety (just like slices of a pastry pie)
Student Voice	Youth ability to speak up about what students want, need, and hope to see change
Tía	"Aunt" in Spanish
Testimony(ies)	Formal written or spoken statement giving evidence or proof of something

Extension Activities: Youth Voice and Agency

These activities explain the basics of advocacy and provides resources such as videos, sample advocacy letters, and project ideas to help youth learn about and practice advocacy strategies.

Activity	Estimated Time	Target Audience	Description
Youth Advocacy for Change resources by Learning to Give	10 min - 1 hour	K-12th or 5-18 yrs	This webpage includes definitions, videos, book guides, and project ideas for supporting youth voice and agency.
How to Use Data for Advocacy by Voices of Youth	10 min	7th-12th or 12-18 yrs	Watch Video 1: The Power of Data Use for Advocacy, Video 3: Using Data to Understand Policy, and Video 6: Using Data to Tell a Story to understand the basics of advocacy and be able to explain several different ways that individuals can advocate for a cause. Optionally, follow up using one of the other extension activities below.
Write an Advocacy Letter	45 min	7th-12th or 12-18 yrs	Use the Persuasion Map handout by ReadThinkWrite and Sample Advocacy Letters by the National Coalition of on Children and Disasters to write an advocacy letter to your school superintendent, school board members or other district/regional/state representative Optionally, watch the videos from the How to Use Data Advocacy activity above as an introduction.
Introduction to Advocacy Curriculum by Project SHARE, University of Maryland	4-5 hours	9th-12th or 14-18 yrs	Follow Module VI to introduce the principles of health advocacy and health policy, focusing on developing effective, persuasive communications.

Extension Activities: Advocacy in CS

The following are a collection of hands-on coding projects related to advocacy and an interview exercise to investigate why CS education is important.

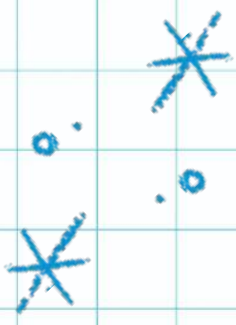
Activity	Estimated Time	Target Audience	Description
Code at Home Activities by Girls Who Code	1-4 hours	8-12th or 13-18 yrs	This webpage includes hands-on coding project toolkits from Girls Who Code for creating a PSA, presenting data and creating an activist website. Each activity features a woman in tech who pioneered innovative technology.
Why is learning CS important?	30-60 min	6th-12th or 11-18 yrs	In *Power On!* Chapter 7, the characters interview their their parents. Conduct interviews with other people you know (students, teachers, administrators, friends, family members, and community members) to learn more about why they think it's important for all people to learn CS.

Additional Resources

The following books and accompanying guides by Learning to Give can provide further reading, discussion, and activities related to activism and social justice:

- *Just Mercy* by Bryan Stevenson is a nonfiction account of one attorney's journey to acquit innocent Black men on death row. Guide available for 6-12 grades
- *Say Something* picture book by Peter Reynolds is an empowering story about finding your voice, and using it to make the world a better place. Guide available for Pre-K-8th grades
- *Sometimes People March* picture book presents an accessible introduction to political protest by Tessa Allen. Guide available for Pre-K-5th grades
- *The Hate U Give* novel by Angie Thomas was inspired by the Black Lives Matter movement. - Guide available for 8th-12th grades. Discussion guides and reading resources are also available from Angie Thomas' website.

APPENDIX



Topic Index

The table below lists the topics found in *Power On!* and indicates which chapter(s) they are addressed in.

Topic	Ch. 1	Ch. 2	Ch. 3	Ch. 4	Ch. 5	Ch. 6	Ch. 7
Algorithmic Bias and Artificial Intelligence	X			X			X
Bullying and Microaggressions			X			X	
Careers with Tech			X	X	X		
CS Heroes				X	X		
Gender Norms	X	X			X		X
Home Life Struggles	X	X	X	X		X	X
How to Be An Ally			X	X		X	X
Identity, Culture, and Belonging	X	X	X		X	X	
Movements and Protests		X		X		X	X
Segregation					X		
Socioeconomic Inequality					X	X	
Stereotypes of Who Does CS			X	X	X	X	X
Technology for Good or Harm	X		X	X			X
Tracking in Schools			X				
Undocumented Immigrants			X		X		
Underrepresentation in CS and Its Impact	X		X	X	X	X	X
What is "Good Trouble"?						X	X
Youth Voice and Agency						X	X

Term	Definition	Ch
Adaptive Technology	Special versions of already existing technologies or tools that provide enhancements or different ways of interacting with the technology to allow individuals with a disability or impairment to accomplish a specific task	5
Adultism	Prejudice and discrimination against young people	6
Advocacy	The act or process of writing or speaking in favor or, or supporting, a cause	7
Agency	Capacity and inclination to act on something and use one's own power to do so	7
Algorithm	A process or set of rules to be followed in calculating other problem-solving operations, especially by a computer.	4
Algorithmic Bias	An algorithm created by humans that has embedded within it the values and inclinations both for and against certain groups, characteristics, cultures, beliefs, etc.	4,5
Algorithm	A procedure used for solving a problem or performing a computation. Algorithms act as an exact list of instructions that conduct specified actions step by step in either hardware- or software-based routines.	1
Ally	Being in support and association with another person or group, especially people and groups that are being oppressed and marginalized.	4
Anonymously	Something that is done without attribution to its do-er/creator	7
App	An application or "app" for short is a computer software or program, often used on smartphones but also other types of computers	7
Artificial Intelligence	The ability of a digital computer or computer-controlled robot to perform tasks commonly associated with human beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience.	1
Avatar	an electronic image that represents and is manipulated by a computer user (as in a computer game)	6
Bias	Prejudice in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair.	1,3 4
Bigotry	Strong beliefs and opinions rooted in prejudice against specific people or groups of people based on their identity and group membership.	5
Black Lives Matter (BLM)	BLM (as a movement) is a decentralized political and social movement that seeks to highlight racism, discrimination, and inequality experienced by Black and African American people. It was started by three Black women (Alicia Garza, Patrisse Cullors, and Opal Tometi), first on social media in response to the killing of innocent Black and African American people by both the police and non-Black people in the US. The movement began in protest to George Zimmerman's acquittal after shooting and killing Trayvon Martin in 2012. The movement continued to grow as more Black and African American people were murdered over the years.	2

Term	Definition	Ch
Chatbot	A chatbot or chatterbot is a software application used to conduct an on-line chat conversation via text or text-to-speech, in lieu of providing direct contact with a live human agent. A chatbot is a type of software that can help customers by automating conversations and interacting with them through messaging platforms.	1
Conductive Thread	Thread that conducts electricity	6
Data	In computing specifically, data refer to information, quantities, symbols, or characters that can be stored and shared by computers, then used for making references and calculating analyses	7
Electronic-Textiles/ E-Textiles	Fabric that enables electronic components such as batteries, lights, sensors, and microcontrollers to be embedded in them	6
Emo	A person who is overly sensitive, emotional, and full of angst, or who adopts a certain style characterized by dyed black hair, tight t-shirts and skinny jeans, etc.	6
Ethnicity	While this is a contested term among anthropologists, sociologists, and others, this generally refers to identification based on shared culture, where people live, language(s) spoken, etc.	1
Gender Expression	The way in which a person expresses their gender identity, typically through their appearance, dress, and behavior.	2
Gender Roles	The role or behavior learned by a person as appropriate to their gender, determined by the prevailing cultural norms.	2
Gender-Expansive	An umbrella term sometimes used to describe people who expand notions of gender expression and identity beyond perceived or expected societal gender norms. Some gender-expansive individuals identify as a mix of genders, some identify more binarily as a man or a woman, and some identify as no gender (agender). Gender-expansive people might feel that they exist among genders, as on a spectrum, or beyond the notion of the man/woman binary paradigm. Sometimes gender-expansive people use gender-neutral pronouns (such as they/them), but people can exist as any gender while using any pronouns. They may or may not be comfortable with their bodies as they are, regardless of how they express their gender.	3
"Good Trouble"	The kind of trouble you can be proud of, a term used by civil rights icon John Lewis, to mean standing up to authority for what you believe in	6,7
Halmonee	"Grandmother" in Korean	6
Heterosexism	Discrimination or prejudice against gay people on the assumption that heterosexuality is the "normal" sexual orientation	5
Homophobia	Dislike and prejudice against gay people	5
ICE	ICE stands for Immigration and Customs Enforcement, an agency within the Department of Homeland Security. ICE was created in 2003, as a part of the government's reorganization after the Sept. 11, 2001, attacks.	3
Identity	How one defines oneself in relation to qualities, beliefs, cultural practices, and more. This may or may not be defined according to racial/ethnic identity, gender identity, family origins, etc.	1

Term	Definition	Ch
Interdisciplinary	Relating to more than one branch of knowledge	5
Jim Crow Laws	Laws created in Southern states to enforce racial segregation and discrimination against non-white people, especially Black and African American communities.	5
Juneteenth	Juneteenth commemorates the effective end of slavery in the United States. After the abolishment of slavery in the United States, white people refused to follow the new law and continued to keep African American people enslaved. African American enslaved people were denied access to information about their freedom and had no power to free themselves. Juneteenth (short for "June Nineteenth") marks the day when federal troops arrived in Galveston, Texas in 1865 to take control of the state and ensure that all enslaved people were freed.	1,2,7
Kimbap	Korean version of sushi rolls with cooked meat and vegetables inside	1
Latinx	Refers to the ethnicity of people who are from or have a background in a Latin American country. Since "Latino" is a masculine adjective in the Spanish language and does not give visibility to those who do not identify as men, the term "Latinx" was created with the intention to be inclusive of all gender identities.	1
M'hija	A term of endearment that means "my daughter" in Spanish. It is often used in an affectionate/friendly way between people who are not related to one another.	3
Microaggression	The everyday slights, indignities, put downs and insults that people of color, women and non-binary people, LGBT populations or those who are marginalized experience in their day-to-day interactions with people.	3
Microcomputer	An electronic device with a microprocessor as its central processing unit (CPU)	6
Microcontroller	A small computer on a single metal-oxide-semiconductor (MOS) integrated circuit (IC) chip	6
Minoritize	To make (a person or group) subordinate in status to a more dominant group or its members: For example: Though women constitute a majority of employees, they are routinely minoritized, passed over for promotion, and poorly represented in authority positions.	5
Muchas Gracias	"Thank you very much" in Spanish	7
Nationality	A legal identification of a person in international law, establishing the person as a subject, a national, of a sovereign state. It affords the state jurisdiction over the person and affords the person the protection of the state against other states.	1
Niños	"Kids" in Spanish	1
Pie Chart	A type of graph in which a circle, representing 100% or the entirety of something, is broken up into slices that represent portions of that entirety (just like slices of a pastry pie)	7
Prejudice	Preconceived notions that are not based on actual experience or reason.	3
Protest	A statement or action expressing disapproval of or objection to something.	2
Psychoacoustics	Psychoacoustics combines the study of acoustics and auditory physiology to determine the relationship between a sound's characteristics and the auditory sensation that it provokes.	5

Term	Definition	Ch
Pupusas	Salvadoran cornmeal or rice flour griddle cakes filled with meat, cheese, beans and/or vegetables	1
¡Qué buena onda!	"Beautiful work" in Salvadoran Spanish	6
¡Qué chiva!	"That's cool" in Salvadoran Spanish	6
Race	A social construct that is not rooted in science, but has been created by humans to identify groups based on shared physical characteristics. Race does not clearly delineate identification based on ancestry, heritage culture, etc.	1
Racism	A system that gives power to some and oppresses others based on race. It is the result of social and institutional powers working in tandem with racial prejudice. There are different forms of racism, for example interpersonal, internalized, institutional, and structural to name a few. Interpersonal racism occurs between individuals. Internalized racism is when people apply the system of power and oppression to oneself, resulting in self-hatred and believing that one deserves to be disadvantaged. Institutional racism refers to how policies and practices either within or across institutions favor a specific group and disadvantages others. Structural racism involves a system of institutional practices, public policies, and belief systems creating structures of power for some and oppression for others.	1
Racist	Actions, measures, ideas, policies, etc. that produce and sustain that one racial group is superior to another racial group, thereby supporting systems of power and oppression that elevate some and oppress all others.	1
Racist AI	Artificial intelligence (AI) is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment. Racist AI refers to the fact that the algorithms that underpin AI reflect the biases of their human programmers (due to the data input, the programming created). This means AI can have racist and biased results that perpetuate inequities in our society, economy, and culture.	1 3
"Redeem the soul of America"	Moral and spiritual transformation of the nation	6
Segregated	Divided by race/ethnicity, often meaning only white people had access to certain resources	5
Senile Punk	Sarcastic and ableist put-down that Christine says to make fun of the fact that her "emo" (not "punk") friend cannot remember something she told him in the past and is therefore senile	6
Socioeconomic Inequality	Ways in which social class, education and/or household income vary widely across groups of people and how it then affects those groups	5
Socioeconomic Status	Referring to one's social standing or class based on one's financial status, education, and occupation.	4
Stereotype	A widely held but fixed and oversimplified image or idea of a particular type of person or thing	3,5
Student Voice	Youth ability to speak up about what students want, need, and hope to see change	7

Term	Definition	Ch
Sugohaesseo	"Good job, you worked hard" in Korean	6
Surveillance	The monitoring of behavior, many activities, or information for the purpose of information gathering, influencing, managing or directing. Surveillance is historically associated with monitoring criminal activity, but is increasingly directed at the general public.	3
Testimony(ies)	Formal written or spoken statement giving evidence or proof of something	7
Tía	“Aunt” in Spanish	1,6,7
Transgender	Denoting or relating to a person whose sense of personal identity and gender does not correspond with the sex they were assigned at birth	5
Transphobia	Dislike and prejudice against transgender people.	5
Undocumented	Refers to anyone residing in any given country without legal documentation. It includes people who entered the U.S. without inspection and governmental permission, and those who entered with a visa that is no longer valid.	3
Words of Affirmation	Positive words and phrases that communicate your love, appreciation, and respect for another person; used to uplift someone	6

Name: _____

Discussion Questions

Answer each question in the box below.

1. What are examples of algorithms that you use in everyday life?

2. Do you think robots or technology can be racist?

3. Do you think there is a connection between the low numbers of Black/African American people in the tech industry and the misidentification of a Black man by the AI facial recognition system? Why or Why not?

4. Why do you think only 29% of the AP Computer Science test-takers were girls, even though 56% of AP test-takers girls were?

5. What is the number OR percentage of students that are taking computer science in your state?

6. How many high schools in your state offer computer science?

7. In your state, how many Black, Brown, Indigenous/Native, and other People of Color and those who identify as women, have taken the AP Computer Science Principles and/or AP CSA exam in the last two-three years?

Name: _____

Discussion Questions

Answer each question in the box below.

8. Why do you think there has been racial bias in facial recognition systems?

9. What character do you most identify? Explain your answer.

10. Have you ever directly experienced bias? How? When? Why?

11. Why do you think this chapter is titled, "This is Messed Up?"

Chapter 1: This Is Messed Up

Name: _____

Comprehension Questions

Answer each question in the box below.

1. Where is the setting of this story?

2. What are Antonio's parents fighting about?

3. What is the name of the restaurant that the friends hangout at?

4. Why is Christine enrolled in summer school and what course is she taking?

5. What are Antonio and Taylor going to miss about not being at the same school with Christine?

6. What newsfeed made Antonio upset?

7. What is Artificial Intelligence?

8. What are some characteristics that artificial intelligence can learn?

9. What is an algorithm?

Name: _____

Comprehension Questions

Answer each question in the box below.

10. List 2 articles that Antonio found when he searched "racist AI" on his phone.

11. What is the name of the computer scientist who is fighting “bias in algorithms" AND what was the issue that this person discovered in her research? What did she have to do in order for her computer to recognize her?

12. What is the percentage of the Black and Latinx workforce in comparison to the Black and Latinx population in California?

13. Only 26% of the professional computing occupations are held by women, even though women make up 50% of the population. Of the 26%, what is the percentage of the women in tech that are African-American, Asian, and Latina?

14. What is the percentage of students that are enrolled in Computer Science courses in the state of California?

15. Describe the four main characters in this graphic novel. What do we know about each character so far?

Chapter 1: This Is Messed Up
Answer Key

Comprehension Questions

1. Where is the setting of this story?
   - A large U.S. west coast city (3)
2. What are Antonio's parents fighting about?
   - Money (6)
3. What is the name of the restaurant that the friends hangout at?
   - Lenny's (7)
4. What summer school course is Christine enrolled in? Why is Christine enrolled in summer school?
   - Math (8)
   - Christine earned a "bad grade," a C, in her math class. (8)
5. What are Antonio and Taylor going to miss about not being at the same school with Christine?
   - Sharing lunch, specifically Christine's kimbap and pupusas (9)
6. What newsfeed made Antonio upset?
   - Police shoot and kill unarmed Black man after misidentifying the victim using Artificial Intelligence (10)
7. What is Artificial Intelligence?
   - When computers think and act like humans and are programmed to learn (11)
8. What are some characteristics that artificial intelligence can learn?
   - Ability to reason, discover meaning, generalize, or learn from past experience (11)
9. What is an algorithm?
   - Instructions, a set of rules to be followed (11)
10. List 2 articles that Antonio found when he searched "racist AI" on his phone.
    - A Beauty Content Was Judged by AI and the Robots Didn't Like Dark Skin
    - Racist Chatbot Reveals the Danger of Online Conversation
    - There Is a Racial Divide in Speech-Recognition Systems
    - Millions of Black People Affected by Racial Bias in Health Care (11)
11. What is the name of the computer scientist who is fighting "bias in algorithms" AND what was the issue that this person discovered in her research? What did she have to do in order for her computer to recognize her?
    - Joy Buolamwini (13)
    - She was studying AI but had to wear a white mask for the computer to even recognize her. (13)
    - In her research she found that current AI has difficulty recognizing gender and people with darker skin. (13)
12. What is the percentage of the Black and Latinx workforce in comparison to the Black and Latinx population in California?
    - 7% workforce vs 39% (Latinx) + 6% (Black) population (14)
13. Only 26% of the professional computing occupations are held by women, even though women make up 50% of the population. Of the 26%, what is the percentage of the women in tech that are African-American, Asian, and Latina?
    - 7% Asian, 3% African American, 2% Latina (14)
14. What is the percentage of students that are enrolled in Computer Science in the state of California?
    - 3% (14)
15. Describe the 4 main characters in this graphic novel. What do we know about each character so far?
    - Taylor: Black/African American girl, mom runs a daycare where she helps out, skateboards, likes to text with her friends
    - Jon: White boy, queer, often has to babysit his sibling, likes make up
    - Antonio: emo boy, Latinx boy, identifies as "emo" and loves music, his parents are often fighting, likes to ride his scooter
    - Christine: Asian/Latinx (Korean and Salvadoran) girl, struggles academically with math, aunt works at Lenny's, loves puppies.

Name: _____

Discussion Questions

Answer each question in the box below.

1. What is a protest? What are some protests that you have heard about? Why do people protest?

2. What do you believe are the main reasons behind the BLM national protests?

3. Is lying always bad? Is there a time when lying is ok?

4. Taylor's family celebrates Juneteenth. What are some holiday's you and your family celebrate?
    a. Why are these celebrations important to you and your family or community?
    b. What types of activities or foods do you have at your celebrations?

5. Read the signs at the protest on page 18. Pick one and explain what it might mean.

6. Why do you think Christine's mom is proud of her even though she lied?

7. What does it mean to be proud of someone?

Name: _____

Discussion Questions

Answer each question in the box below.

8. In this chapter we see Jon doing his nails and talking about doing makeup, two things that appear to go against traditional gender roles. Do you see gender roles playing a big role for young people today? Do you believe that gender roles should exist? Explain your answer.

9. Have you experienced starting at a new school or a new activity where you do not know many people? What does it feel like when you are the new kid?

Chapter 2: Summertime

Name: _____

Comprehension Questions

Answer each question in the box below.

1. Where were the friends headed at the beginning of Chapter 2?

2. Why did the friends want to go to this protest?

3. Why did Christine lie about what she and her friends were doing?

4. How did Christine's mom respond to Christine lying and going to the protest?

5. What is Juneteenth and why is it important to remember?

6. What do Christine's friends agree to do for her?

7. What are some activities that we see Jon doing during this chapter?

8. Which friends are going to school together?

Comprehension Questions

1. Where were the friends headed at the beginning of Chapter 2?
   - Black Lives Matter Protest (16)
2. Why did the friends want to go to this protest?
   - Because of the article they read about a police shooting of a Black man who was misidentified by AI.
3. Why did Christine lie about what she and her friends were doing?
   - Because she knew her mom would not let her go. So she told her mom that she was studying. (16)
4. How did Christine's mom respond to Christine lying and going to the protest?
   - Christine's mom was upset she lied but was proud of her for going to the protest. (18)
5. What is Juneteenth and why is it important to remember?
   - Juneteeth celebrates when the very last enslaved person was freed. It is important to remember because even though slavery was abolished people still kept enslaved people. (21)
6. What do Christine's friends agree to do for her?
   - Help her study for her class. (22)
7. What are some activities that we see Jon doing during this chapter?
   - Doing makeup, painting nails, playing video games. (24-25)
8. Which friends are going to school together?
   - Jon and Christine. (25)

Chapter 3: High School Begins

Name: _____

Discussion Questions

Answer each question in the box below.

1. Have you ever avoided a school function or extracurricular activity because you felt unsafe or uncomfortable?

2. What do you think the counselor meant when she said, "You're in 'Hospitality and Tourism' class during period 4. Isn't that a better fit for you?

3. What are current day gender stereotypes and how are they related to the statistics of who studies CS?

4. Think of a time you felt underestimated. Why do you think it happened, and how did you respond to it?

5. Throughout the chapter, different characters step up in different ways to support each other. List all the ways you see allyship. Think of a time when you needed support or when you gave support to someone who needed it. What was that experience like?

6. Before this class/lesson, what did you think computer science was? How has your perception of CS changed since this class? Since this graphic novel?

7. How has computer science affected your life? Think of all the different ways.

Name: _____

Discussion Questions

Answer each question in the box below.

8. What do you think are the pros and cons and threats of technology to our privacy?

Chapter 3: High School Begins

Name: _____

Comprehension Questions

Answer each question in the box below.

1. What happened to Jon and Taylor in their classes? How were their experiences similar? How were they different?

2. Why do many LGBTQ+ students avoid school functions and extracurricular activities?

3. How more likely are LGBTQ+ students to be bullied on school property or cyberbullied compared to their heterosexual peers?

4. What 4 LGBTQ+ resources were listed?

5. How do the characters respond when they realize they are getting different educational experiences?

6. What does Antonio's Intro to CS teacher do that's made a positive impression on him?

7. What is Christine concerned about the impact of info being tracked on phones and the internet?

8. About how many undocument immigrants live in the U.S.?

Chapter 3: High School Begins

Name: _____

Comprehension Questions

Answer each question in the box below.

9. What is computer science?

10. How is CS changing different fields? (i.e. entertainment, health care, sports, education, fashion, climate change, space exploration, etc.)

11. What was the counselor's response when Christine requested to enroll into the Intro to Computer Science course?

12. What was Christine's reaction to the visit to the counselor?

13. How did Christine's teacher help Christine process her upsetting visit to the counselor?

14. How did Christine's teacher learn about the new coding club for girls only?

Comprehension Questions

1. What happened to Jon and Taylor in their classes? How were their experiences similar? How were they different?
   - Jon was bullied for being gay, and Taylor was confused with another Black student. Both experienced ignorance related to their identity and both were hurt by the experience. The experiences were different because Jon was purposely targeted while Taylor's teacher did not necessarily have malicious intent. However both experienced forms of discrimination that were hurtful. (34-37)
2. Why do many LGBTQ+ students avoid school functions and extracurricular activities?
   - Most LGBTQ+ students avoid school functions and extracurricular activities because they feel unsafe or uncomfortable. (37)
3. How more likely are LGBTQ+ students to be bullied on school property or cyberbullied compared to their heterosexual peers?
   - Bullying on school property - LGTBQ+: 33% vs non-LGBTQ+ Peers: 17.1%
   - Cyberbullying - LGTBQ+: 17.1% vs non-LGBTQ+ Peers: 13.3% (37)
4. What 4 LGBTQ+ resources were listed?
   - The Trevor Project, Human Rights Campaign, The US Government Stop Bullying Website, GLSEN (37)
5. How do the characters respond when they realize they are getting different educational experiences?
   - They are frustrated at first, but they promise to share what they are learning together. (43)
6. What does Antonio's Intro to CS teacher do that's made a positive impression on him?
   - She learned her students' names within a day of meeting them and she shakes their hands at the door saying, "Welcome, Computer Scientists!" (40)
7. What is Christine concerned about the impact of info being tracked on phones and the internet?
   - Her dad is undocumented and she's concerned that ICE might find him. (41)
8. About how many undocument immigrants live in the U.S.?
   - 11 million (41)
9. What is computer science?
   - CS is about the study of computers, including both hardware and software, and how they can be applied to solving real-world problems. (44)
10. How is CS changing different fields? (i.e. entertainment, health care, sports, education, fashion, climate change, space exploration, etc.)
    - Entertainment: mix beats & make all genres of music, special effects & animation in film/TV
    - Health Care: create medicine & vaccines, help decide patient treatment (44)
    - Fashion: design incorporates microcomputers, sensors, LEDs into fabric for it to make sounds, light up, and sense and react to the environment
    - Climate Change: analyze data to address how trapped greenhouse gases are affecting sea levels, droughts, hurricanes, fires, and heat waves
    - Space Exploration: program a computer to control the motors, science instruments, and communication (sending of data between Mars & Earth for the Mars Rover
    - Sports: head sensors, data analytics, and machine learning allow coaches and families to receive quick info about the severity of brain injuries during sports events (45)
11. What was the counselor's response when Christine requested to enroll into the Intro to Computer Science course?
    - The counselor was more encouraging of Christine staying in her "Hospitality and Tourism" course and told her that the class is full. The counselor told Christine to try out the Hospitality and Tourism course for a couple of weeks. (48)

Comprehension Questions

12. What was Christine's reaction to the visit to the counselor?
    - Christine was annoyed and felt that she was being dismissed because of her gender and race/ethnicity. (49)
13. How did Christine's teacher help Christine process her upsetting visit to the counselor?
    - Christine's teacher recommended that Christine join the afterschool computer club. (50)
14. How did Christine's teacher learn about the new coding club for girls only?
    - Christine's teacher saw it in the school bulletin. (50)

Chapter 4: Why Do We Need to Learn Computer Science?

Name: _____

Discussion Questions

Answer each question in the box below.

1. Antonio uses music to cope/deal with the issues at home. What are ways that you manage stressful situations?

2. Taylor's Computer teacher confuses Taylor and Janelle (the only 2 African-American young women students in the class). Has this ever happened to you? What do you think Taylor and Janelle should do to correct the teacher?

3. Antonio's father has left the home and it is now his older brother, mom, and him living in the home. This is a form of separation/loss.
   a. Have you ever experienced loss in your life?
   b. What was Antonio and his brother's solution to assisting mom with the household finances?
   c. How do you help support your family and/or community, either financially or emotionally or in daily chores?

4. What are some CS/technology integrations that impact the medical industry?

5. Why do you think that most of the Game Company employees were white males?

6. Does the fact that the tech industry is mostly white males motivate you or discourage you from taking an interest in CS? Do you feel like you would fit in?

7. How is computer science involved in the jobs that you are interested in?

Chapter 4: Why Do We Need to Learn Computer Science?

Name: _____

Comprehension Questions

Answer each question in the box below.

1. Since Christine was unable to be enrolled in the Computer Science class, what did she do as an alternative to learn more about computer science?

2. Christine is feeling pressure from her parents about her grades. Why do you think her parents are concerned about her education and grades?

3. Jon has a new ally in his Computer Science class. What do you think the role of an ally is?

4. During Antonio's class field trip at the Game Design company, not everyone was a computer scientist. What were other positions that were part of the company's team?

5. Why did one of the students make the comment, "I do not want to be in game design, because no one looked like me"?

6. Why did Antonio's teacher, Mrs. Martinez, choose to teach computer science?

7. If a student wanted to be a nurse, why would it be important for that student to learn computer science?

Name: _____

Comprehension Questions

Answer each question in the box below.

8. Which four women authors are listed? How does their writing shed light on issues within computer science?

Chapter 4: Why Do We Need to Learn Computer Science?
ANSWER KEY

Comprehension Questions

1. Since Christine was unable to be enrolled in the Computer Science class, what did she do as an alternative to learn more about computer science?
   - Christine joined an after school girls coding program. (53)
2. Christine is feeling pressure from her parents about her grades. Why do you think her parents are concerned about her education and grades?
   - Her parents risked a lot to immigrate to the United States and offer their children a better life. They did not have the same educational opportunities that Christine has and they want to make sure she can have a better experience than what they received. They are invested in her education because it will open doors for her in the future and they want to see her live well. (58)
3. Jon has a new ally in his Computer Science class. What do you think the role of an ally is?
   - An ally takes action to support people from underrepresented groups. People who stand up against discrimination and bias. An ally uses the power they have to help others.
4. During Antonio's class field trip at the Game Design company, not everyone was a computer scientist. What were other positions that were part of the company's team?
   - Writers, artists, programmers, game testers
5. Why did one of the students make the comment, "I do not want to be in game design, because no one looked like me"?
   - The workers at the game design company were mostly white men. Since the student's identity is not represented, she doesn't feel like she would belong.
   - The student may be judged more harshly as an outsider in the company and may feel overly conscious of herself and her work as the only person of her particular identity in the space. Many minoritized people are used to being the first, the only, etc. in specific places and spaces, so belonging is not a necessity but fair treatment is. (65)
6. Why did Antonio's teacher, Mrs. Martinez, choose to teach computer science?
   - She feels every student should learn CS, so they can make important impacts in their fields when they are older. (66)
7. If a student wanted to be a nurse, why would it be important for that student to learn computer science?
   - Computer science impacts every field. In medicine, computer algorithms contain biases that negatively affect patient outcomes, especially for people of color. (67)
8. Which 4 women authors are listed? How does their writing shed light on issues within computer science?
   - Cathy O'Neil, Ruha Benjamin, Safiya Umoja Noble, Virginia Eubanks
   - All write on algorithmic bias in different settings and describe how computer science can have potential negative impacts on our society (e.g. medicine, search engines). (68-69)

Chapter 5: Someone Like Me

Name: _____

Discussion Questions

Answer each question in the box below.

1. On page 72, the friends are discussing how their teachers address or ignore race/ethnicity in the classroom. Why is it important to address race/ethnicity in school settings? What do you wish teachers would discuss in relation to race/ethnicity?

2. On page 73, the group talks about barriers to computer science education. Can you think of other ways computer science may not be accessible?

3. On page 76, the friends are discussing how a lack of access led to a disparity for Black swimmers. What contributed to those barriers? How is this relevant to computer science education and careers in technology?

4. The friends joke about Christine pursuing diving because she is half Korean, and also discuss the stereotypes that shaped Taylor's family's experience with swimming. Have people ever teased you or treated you differently based on stereotypes? Were there times when this made you laugh, and other times when you felt upset?

5. From pages 78 to 82, we encounter eleven different figures in computer science. Which person did you most relate to? Why?

6. Did any of these people stand out to you? What about them did you find most interesting? Why?

7. Choose one of the people discussed in this chapter and identify the different layers of their intersectional identity. Intersectionality is the way in which different identities collide and work together. For instance, someone may be Black, a girl, and queer. These identities all describe a person, and alter how they experience the world. How might these different aspects of identity affect their access to computer science?

Name: _____

Comprehension Questions

Answer each question in the box below.

1. List the ways that the group discusses as to why students may lack access to computer science education.

2. Who was Anthony Evans?

3. What laws made swimming pools segregated?

4. What was Katherine Johnson's job at NASA?

5. What kind of research does Joy Buolamwini conduct?

6. What is the goal of Tristan Walker's nonprofit Code2040?

7. Why did Laura Gomez switch her major in college?

8. What two organizations did Rediet Abebe co-found?

9. What team was Chanpory Rith a part of at Google?

Name: _____

Comprehension Questions

Answer each question in the box below.

10. What was Timnit Gebru critical of at Google?

11. Why did IBM fire Lynn Conway?

12. What kind of company is Farida Bedwei's Logiciel?

13. How did Erin Ishimoticha (previously Erin Spiceland) learn computer science?

14. What does Joshua Miele's Tactile Maps Automated Production make?

Chapter 5: Someone Like Me
ANSWER KEY

Comprehension Questions

1. List the ways that the group discusses as to why students may lack access to computer science education.
   - Schools may not offer it, lack of money, classes are full, students getting tracked out of classes even when they are available based on stereotypes, lack of teachers available to teach CS
2. Who was Anthony Evans?
   - The first Black swimmer on the US olympic team (75)
3. What laws made swimming pools segregated?
   - Jim Crow Laws (76)
4. What was Katherine Johnson's job at NASA?
   - Human Computer (78)
5. What kind of research does Joy Buolamwini conduct?
   - Studies human bias and how it shapes CS (78)
6. What is the goal of Tristan Walker's nonprofit Code2040?
   - Working to build a bridge between Black and Latinx students and CS career opportunities, aiming to reach full representation by 2040 (78)
7. Why did Laura Gomez switch her major in college?
   - She was discouraged by the lack of diversity in the department (79)
8. What two organizations did Rediet Abebe co-found?
   - Mechanism Design for Social Good and Black in AI (79)
9. What team was Chanpory Rith a part of at Google?
   - GMail (80)
10. What was Timnit Gebru critical of at Google?
    - Google's hiring practices that resulted in the underrepresentation of women and People of Color. Also racist and sexist AI programs developed and/or used at Google. (80)
11. Why did IBM fire Lynn Conway?
    - For sharing her intention to transition from identifying as a man to a woman (81)
12. What kind of company is Farida Bedwei's Logiciel?
    - A microfinance software company (81)
13. How did Erin Ishimoticha (previously Erin Spiceland) learn computer science?
    - She is self taught (82)
14. What does Joshua Miele's Tactile Maps Automated Production make?
    - Tactile street maps that can be printed at home on braille embossers. (82)

Chapter 6: We Are the Change We Want

Name: _____

Discussion Questions

Answer each question in the box below.

1. Why do you think Christine reacted the way she did after Antonio asked how her project was computer science?

2. What does “good trouble” mean to you?

3. Christine was nervous to formally present her project to others. What are ways that you prepare for moments that make you nervous?

4. What is a project you have made in your life that you are proud of? What did you make and why?

5. What are examples of adult-ism in this chapter?

6. Have there been issues in your school where you feel the students were not listened to? If so, describe those scenarios.

7. When are moments when you feel like you have taken a stand for something you believe in, whether in everyday small ways in your life or in bigger ways like Christine’s presentation or the friends’ decision to present to the School Board?

Chapter 6: We Are the Change We Want

Name: _____

Comprehension Questions

Answer each question in the box below.

1. What's the name of the restaurant that the four students hang out at?

2. What type of work does Antonio do?

3. Why does Antonio work a lot?

4. What's the name of the place that Antonio works at?

5. What projects are Christine, Jon and Taylor working on?

6. How does Christine's light-up banner work?

7. What other projects were shared at Christine's club's presentation?

8. Who coined the term "good trouble"? What did this person mean by this idea?

9. How does Christine explain "good trouble" in her presentation?

Chapter 6: We Are the Change We Want

Name: _____

Comprehension Questions

Answer each question in the box below.

10. Who helped Christine sew the banner?

11. What were Mr. Russell's reasons for forming the Young Women's Computer Science Club?

12. What motivates the four friends to take action towards increasing access to Computer Science?

13. Why did the group decide to wait and present to the school board in the Fall instead of organizing a presentation immediately?

Chapter 6: We Are the Change We Want
ANSWER KEY

Comprehension Questions

1. What's the name of the restaurant that the four students hang out at?
   - Lenny's (83)
2. What type of work does Antonio do?
   - Stocks items at a grocery store (84)
3. Why does Antonio work a lot?
   - Antonio and his brother are financially helping to cover the cost of rent. (83)
4. What's the name of the place that Antonio works at?
   - SuperMART (85)
5. What projects are Christine, Jon and Taylor working on?
   - Antonio is working on an app for class, Christine is sewing microcontrollers onto a fabric banner, Jon is helping Christine with a building a website (86)
6. How does Christine's light-up banner work?
   - Microcontrollers with lights are sewn using conductive thread onto fabric (88)
7. What other projects were shared at Christine's club's presentation?
   - Website for custom avatars and wellness app (91)
8. Who coined the term "good trouble"? What did this person mean by this idea?
   - John Lewis (92)
   - He meant to stand up for what you believe in.
9. How does Christine explain "good trouble" in her presentation?
   - "Good trouble" is necessary trouble that helps redeem the soul of America. (92)
   - Christine is thinking about how it is necessary to engage in collaborative action with the community to support positive social change; sometimes this might be viewed as being "troublesome" by some people in our communities, but actually it could serve to help the greater "good."
10. Who helped Christine sew the banner?
    - Her mom & Halmonee (her Korean grandmother) (92)
11. What were Mr. Russell's reasons for forming the Young Women's Computer Science Club?
    - Mr. Russell is the only Black person at his work in Information Technology, and he wants to see more people like his daughter and others to lead the tech industry. (93)
12. What motivates the four friends to take action towards increasing access to Computer Science?
    - There aren't enough people like them working in companies that create racist, sexist, and biased tech. (95)
13. Why did the group decide to wait and present to the school board in the Fall instead of organizing a presentation immediately?
    - Not rush the process and spend summer preparing (96)

Name: _____

Discussion Questions

Answer each question in the box below.

1. Who are some people that you think are making “good trouble”? Why?

2. Why do you think not all students get to take CS classes? Why do you think only certain schools have CS classes?

3. How do you think computer science classes in your school could impact your community? You? Other students?

4. Do you think the students' voices will be heard or respected in the school board meeting? Why?

5. What is your superpower as a student?

6. Who takes CS in your school? Do you see patterns in who takes, or who has access to, CS in your school? How is this tied to larger issues in your school?

7. Have you ever taken action on something important to you? If yes, what did you do and why? If not, what is an issue you would want to discuss with your school board or community and why?

Name: _____

Comprehension Questions

Answer each question in the box below.

1. What are the possible solutions the students are taking to the school board?

2. Where do they plan to collect data from? How do they plan to share the data with the school board? Provide examples.

3. What is their plan for protecting student privacy when sharing other students' stories with the school board?

4. What did Antonio create as his own contribution to helping people? What is the purpose of his project?

5. What are the reasons why Taylor believes it is important to talk to the School Board about CS Education? Provide at least 2 examples.

Comprehension Questions

1. What are the possible solutions the students are taking to the school board?
   - Create a website
   - Include data (100-102)
2. Where do they plan to collect data from? How do they plan to share the data with the school board? Provide examples.
   - Interviewing students, teachers and parents (106)
   - Asking students who is in those classes (gender and race/ethnicity) (105)
   - Use pie charts showing the class make up. (101)
   - Also collecting the data on who enrolls in those classes (101)
   - Calling different schools to find out if they offer CS classes and which ones. (101)
3. What is their plan for protecting student privacy when sharing other students' stories with the school board?
   - They would collect the stories of students anonymously so as to protect their identity.(104)
4. What did Antonio create as his own contribution to helping people? What is the purpose of his project?
   - He created an app(application) for students that can send anonymous posts explaining stuff they don't want to say out loud. The app collects everyone's posts so you can read other ppl who are dealing with the same problem(s). (111)
5. What are the reasons why Taylor believes it is important to talk to the School Board about CS Education? Provide at least 2 examples.
   - She believes that technology controls everything in our lives and everything scientists make influences how we do almost everything and that students should learn about those things.
   - She also believes that we are dependent on technology as we are on oxygen or water.
   - She wants the school board to understand that students learning CS can
   - Stop racist algorithms– if students that look like her and her friends could create those algorithms it can create a different perspective. (117)