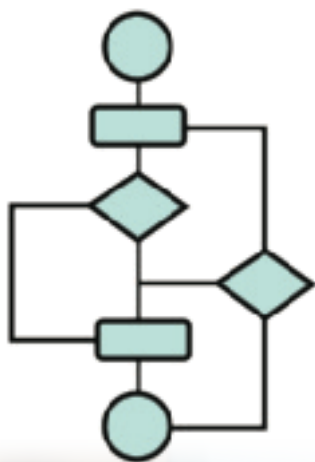


Designing Computer Programs

Working together



Planning



Data



Programs for learning



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Designing Computer Programs



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Designing Computer Programs

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Computer Systems

Chapter

1

Margo is excited to get to school today. It is the first day their fifth-grade class becomes buddies with the first-grade class. They are going to help the first graders practice their reading skills and work on fun projects with them. Ms. Ling asks the fifth graders which reading activities they want to do with their buddies. Margo wants to play reading games on the computer with her buddy. Matthew says he wants to read books with his buddy. Adam says he wants to play reading board games, and Jolie says she wants to write and illustrate short stories.



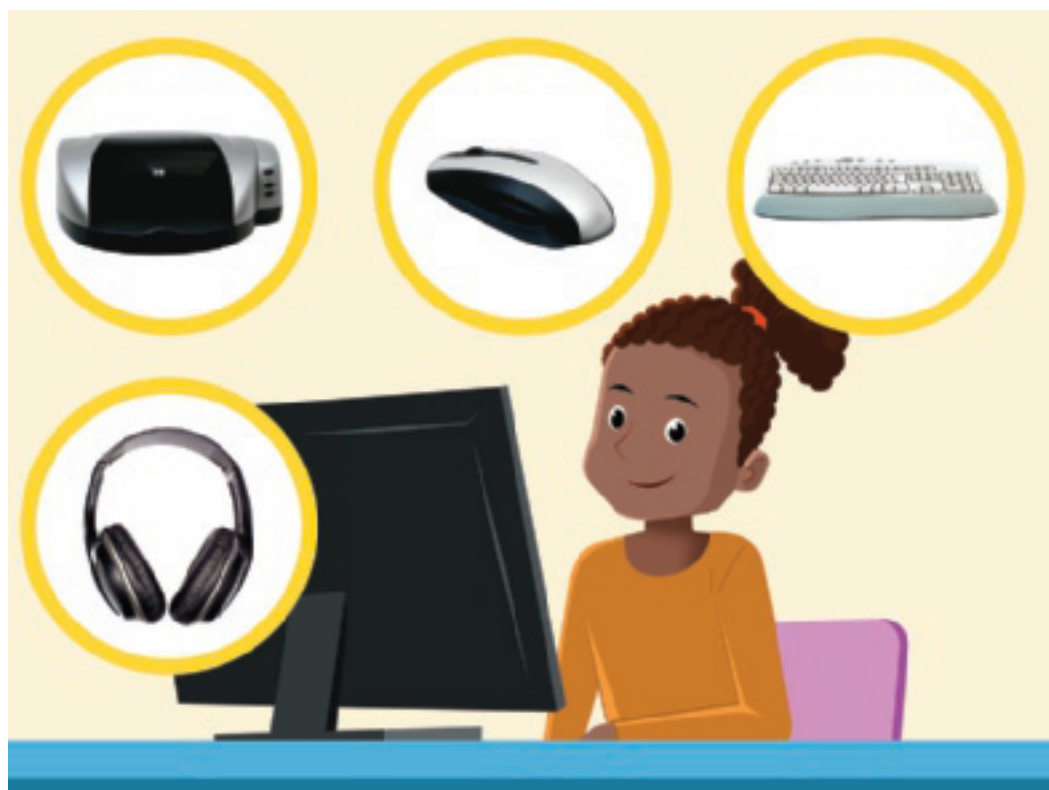
Ms. Ling thinks these ideas sound wonderful! She displays a chart showing each of her students paired with their first-grade buddies and which activity they will do first. She asks them to prepare their activities.

Margo is excited to set up the classroom computer for her and her new buddy, Pablo. She first scans the hardware. She checks to be sure the power cord is plugged into the computer processor. She makes sure there is a keyboard and mouse to input information into the computer. She checks that there is a monitor, a printer, and headphones to provide output from the computer. Margo knows each **component** is important for the entire **system** to function properly.

Vocabulary

component, n. a part of a greater whole

system, n. a set of parts that work together to complete a task



Next, Margo checks to make sure the software is functioning properly. She wants to use a fun reading program with Pablo. She presses the power button on the computer, but nothing appears on the screen. She knows to troubleshoot the problem before asking for Ms. Ling's help. She tries pressing the power button one more time, but still nothing. She checks the monitor cord and discovers that it is not plugged into the processor. She pushes it in farther, and the problem is solved!

Word to Know

To *troubleshoot* means to systematically search for the source of a problem in order to solve it.



Margo clicks the icon to open the reading software she thinks Pablo will enjoy and will help him practice his reading skills. The colorful screen appears, and music starts playing. She plugs in two pairs of headphones for her and Pablo and makes sure she can hear the music in each pair. She tells Ms. Ling that the computer system is ready. Margo is excited to meet Pablo and start!



Communication Between Computers

Chapter

2

In come the first graders! Ms. Rivers, the first-grade teacher, told both classes that they are going to focus on the fifth graders helping the first graders with reading skills. Ms. Ling reads the names of the buddies from the chart, and the pairs meet each other. Pablo is excited he is paired with Margo for computer time. Ryanne is thrilled to read books with Matthew. Adam and JP start to play reading board games, and Jolie shows Carina all the fun art supplies they will use. All the pairs begin their fun activities.



Margo and Pablo go to the computer desk, and she tells him this is one of her favorite programs. “It will help you practice phonics plus read and type short words,” she says. They log in to the account Pablo’s teacher has created for him so Ms. Rivers can see how his learning is progressing. Margo shows him how to use the mouse and keyboard to type his name into the computer. Pablo asks, “How is Ms. Rivers going to see my work if she is not with us right now?” Margo tells him that the information he enters into the computer travels through the **internet** as tiny packets of information broken down into electronic signals. The signals travel through a **network** of many connection points and are put back together, and Ms. Rivers sees them on her computer screen.

Vocabulary

internet, n.

the network of connected computers all over the world

network, n.

a group of computer devices that communicate with each other



Margo lets Pablo know that the software tells the computer what information to collect and store in his account. She explains that his information is organized in his account so that only those he gives access to, such as Ms. Rivers or his parents, will be able to see it. Margo tells Pablo to enter the password his teacher gave him. She reminds him to be careful that he enters the password exactly the same each time he logs in. Pablo says, "My password is . . ."

Margo stops Pablo. She says, "It's very important to protect your personal information, as it is sent through the internet. Don't ever share things like your password, address, or phone number with anyone except for your parents or your teacher." Pablo agrees that he will not share personal information with anyone other than his parents or teacher.



Word to Know

Cyber- is a prefix that means “related to computers or the internet.”

Cyberspace isn’t a physical place, but it’s the concept of a place where all the world’s interconnected digital data are stored and moving about.

Unfortunately, not everyone respects the law and other people’s belongings. Theft and damage happen with real-world objects, and such incidents also happen with data in cyberspace. These incidents are *cybercrimes*.

Cybersecurity is the protection of computer systems, networks, and data from theft or damage from cybercrimes. Many businesses, including banks, have workers dedicated to cybersecurity. So do government agencies and schools.

Here’s a fun *cyber-* word—*cyborg*. Cyborg is short for “cybernetic organism.” You might have seen science fiction movies with fictional cyborg characters in them.



Making Data Useful

Chapter

3

Pablo is having a wonderful time playing the learning games on the computer. Margo is excited as she watches him. Pablo is not only enjoying the activities but is learning a lot! He is picking out the correct letter sounds faster than when he started. He can also recognize more short words than he could at the beginning. It also seems like he is typing more words with the keyboard than when they started. Margo thinks about how wonderful it would be to show Ms. Ling and Ms. Rivers how well Pablo is progressing just in one short session.

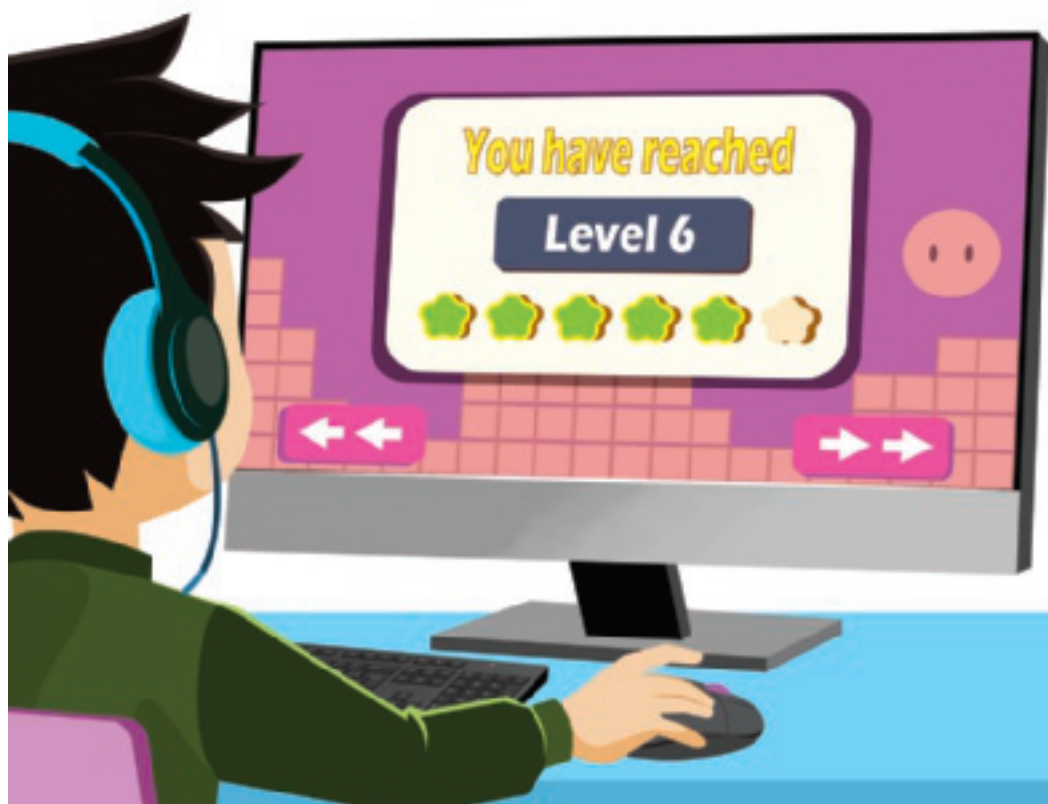


Ms. Rivers gives the students a five-minute time notification. Pablo and Margo need to finish up the reading activities. Pablo is worried all his progress will be lost. Margo assures him that the computer is collecting all of his **data** for **storage**. Every letter sound or word he selects is gathered by the computer and stored in his account. The next time he logs in, the computer will retrieve his stored learning data. Pablo is thrilled to know that the next time he works on the computer, the games will pick back up right where he left off.

Vocabulary

data, n. details of information collected by observation or measurement

storage, n. the practice of keeping information temporarily or permanently



Margo and Pablo see an icon on the screen that looks like a report. They click it, and it opens a report with charts and graphs. Both Margo and Pablo quickly recognize the patterns of information as Pablo's learning data. Margo is thrilled to have a useful tool to share Pablo's reading progress with both Ms. Ling and Ms. Rivers!

Margo is excited to see that her prediction is correct. Pablo did improve his letter sound skills and knows more words than he did at the start of the session. The data also show the areas where he needs more work. She prints a copy to show Ms. Rivers, who is happy with the helpful progress report for Pablo. She now wants reading reports for every one of her students!

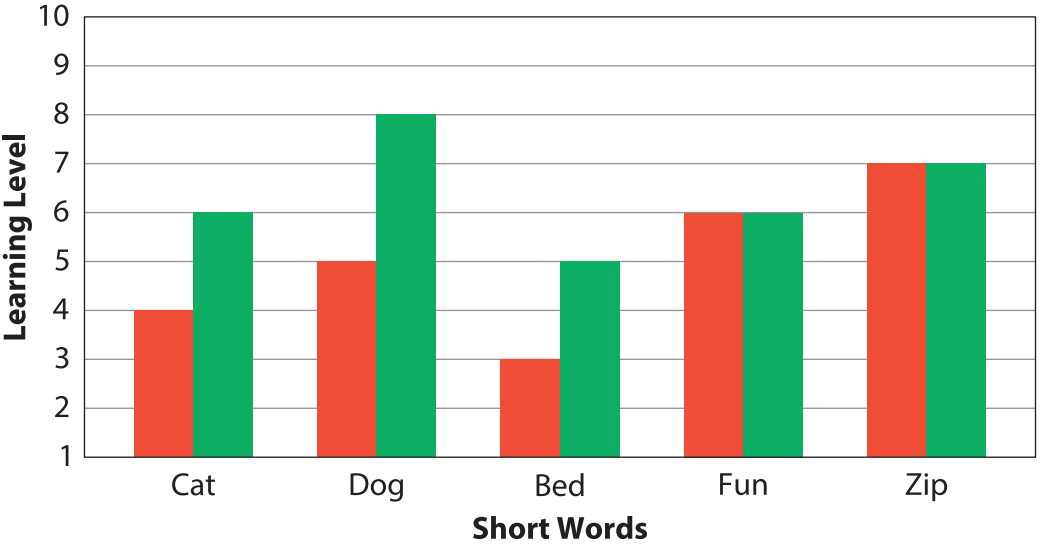
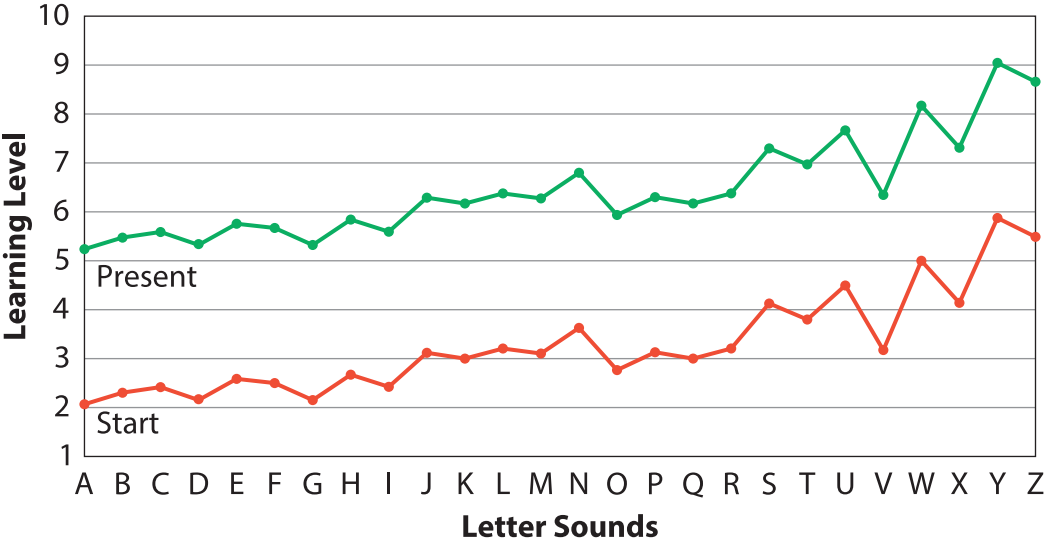
Word to Know

A prediction is a statement about what a person thinks will happen in the future.



Look closely at Pablo’s reading report. Red lines and bars show Pablo’s reading levels at the beginning. Green lines and bars show how much more he learned during practice. Margo thinks his data show that he learned more letter sounds from playing the reading activities.

Which letter sounds does Pablo understand best? Which sound does he need to work on most? Which short words show Pablo’s highest learning levels? Which does he not understand as well?



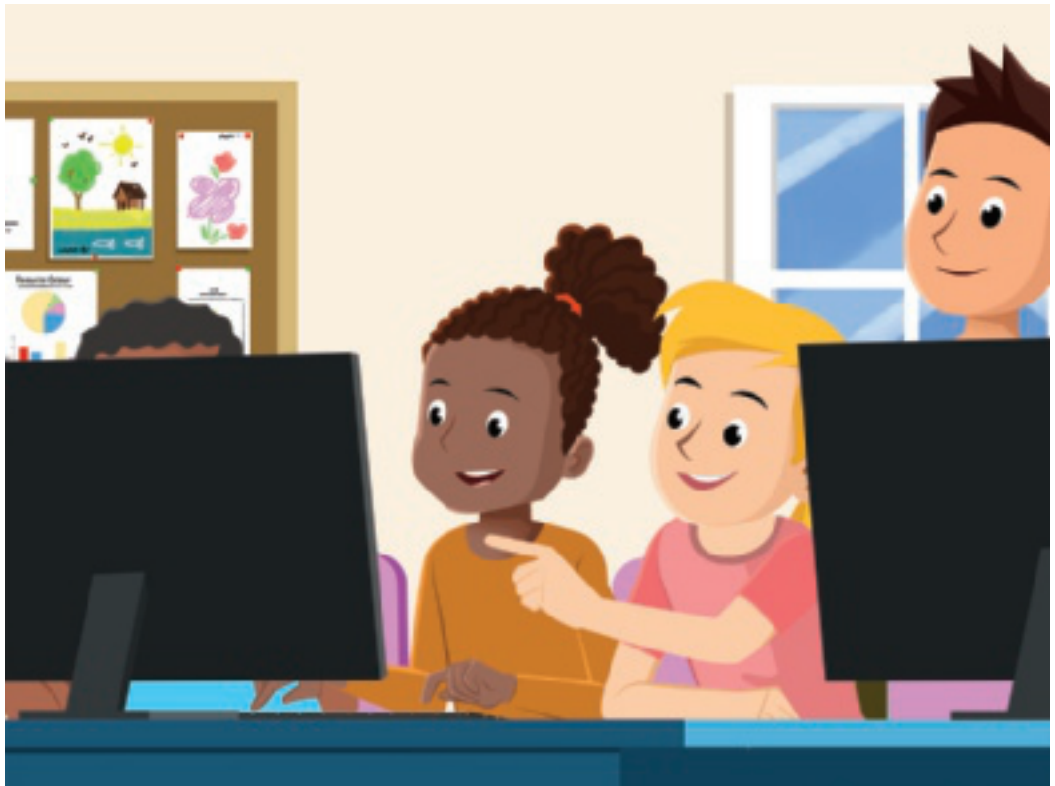
Matthew thinks the reading report Margo generated for Pablo is really helpful. He is excited to create one for his buddy, Ryanne, when it is their turn on the computer. Margo shows Matthew and a few other classmates how to navigate accounts for their buddies and access their reading report.

Ms. Ling gives Matthew a printed reading log to track the books he reads with Ryanne. While the reading log is helpful to record the books they read together, he told Ms. Ling that he wishes it could also show how Ryanne's reading level was progressing, like Pablo's report. He wants to clearly see when she needs to move to another level. He also thinks it would be useful to know which books Ryanne likes best and those she does not enjoy.



Ms. Ling tells Matthew to talk to Margo. She says, “See if she knows anything about digital reading logs.” Margo and Matthew look at the reading programs and reports on the class computer, but none of the software performs the book tracking Matthew wants for Ryanne. They search the internet and find a few that are close, but they cost a lot of money to use.

Margo and Matthew wonder what it would take to build their own reading log program, one that is free and does everything they want it to do. They ask Ms. Ling, and she says, “I don’t know a lot about creating computer programs, but Adam’s mom is a programmer. Maybe we can ask her to come in and tell us all about it.” All of the fifth graders love this idea.



Mrs. Hale, Adam's mom, is a special guest the next week. She is excited that the class is inspired to build a computer reading log program and to know more about how it is done. She tells the class it all starts with **collaboration**.

"First, our development team meets to make a **plan** for how we will design and develop a program," she explains. "Everyone listens respectfully to each other's ideas and perspectives. We speak kindly to one another, even when we disagree. We stay focused on our goal!"

Word to Know

A person's *perspective* is their particular point of view or way of thinking, based on their own experiences.

Vocabulary

collaboration, n. working together as a team

plan, n. a list of steps to achieve a desired outcome



“Then, we make a list of all the tasks we need to complete to build the type of program we want. We discuss the roles each of us will take on to get the tasks completed.” Mrs. Hale continues, “Our plan usually gets revised a few times before we can start building the program.” She asks the class, “What kinds of things will be in your plan for making your reading log program?”



Recall from the beginning of the story, Margo wanted to play reading games on the computer with her buddy. Matthew wanted to read books with his buddy. Adam chose to play reading board games, and Jolie chose to write and illustrate short stories.

- Which team member do you think would enjoy each of the planned tasks most?
- Can a member of a team do more than one role?
- Should everyone contribute equally on a group project?
- Can you think of any other tasks the class did not list?

Designing Programs

Chapter

5

Mrs. Hale continues to tell the class about how she and her team create computer programs. “After each of us knows our roles, we begin designing what the program will do,” she explains. “There are a lot of people on our software team, but I am going to tell you about just a few of them.”

Mrs. Hale continues, “I am the one who designs how the program will be coded on the computer. My colleague Sara meets with the people who will use our program to find out how they want it to work. My colleague Erik designs what the screens will look like so it will be inviting to our customers. And my colleague Austin tests our program to find out if it works well and if our customers like it. We each play an important role in the design process!”

Word to Know

A *design* is a plan for solving a problem that shows what the solution is intended to be like before it is produced.



Mrs. Hale asks the class to think about the tasks they would like to do if they were to build their own reading log program for their first grade buddies. She asks, “Who would enjoy designing how the software would look on the screen?” Jolie excitedly raises her hand first! Mrs. Hale wants to know who would be interested in coding the program on the computer. Margo and other classmates all raise their hands. “And how about testing the program—does that sound fun to anyone?” she asks. Adam and other students are excited about that role. Matthew and Adam both raise their hands and smile at each other when Mrs. Hale asks who wants to figure out what data to collect in the program.

She asks the class to share what they think is the most important information to collect in a reading log program. The students share items the computer should capture, and she makes a list on the board. “These are called **variables**,” she tells the class.

Vocabulary

variable, n. an element that can change based on conditions



Mrs. Hale tells the class that she and her programming team then create a detailed sequence of instructions, or an **algorithm**. An algorithm tells the computer what it should do and in what order. She asks the class to help her sequence how the computer should collect all the variables they listed on the board. She says, "We always create a few versions of our designs so we can compare them and see which will work best."

She tells the class that the art team at her company is also busy designing and sketching how the program might look on the screen. The team creates a few versions of their designs so they can compare them and find out which their company and customers like best.

Vocabulary

algorithm, n. steps or rules to follow to complete a specific task or to solve a problem

Make your own comparison of the two designs for a reading log program that are shown on the next page.

- Which do you think would be easier for the first graders to use?
- Which do you think will give the teachers better information?
- Would you recommend the design on Screen 1 or Screen 2?

Screen 1

Survey questions:

- Type your name.
- Type your grade.
- Type the date.
- Type the book name.
- Type the author.
- Type the illustrator.
- Type the reading level.
- Type the page count.
- Did you read it independently or with help?
- Write a review of the book.

Screen 2

Survey Questions:

- Select your name from a list.
- Select the book from a list.
- Select the date you read the book.
- Did you read it independently or with help?
- Select a book rating from 1 through 5 with 5 being the best.

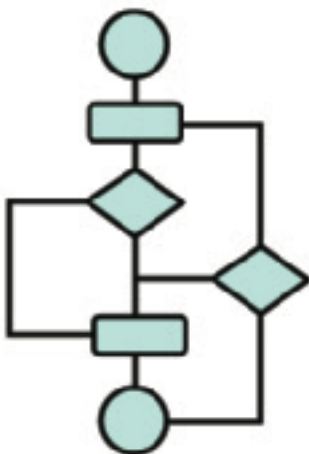
Computer Code

Chapter

6

Mrs. Hale continues to tell the class about the development process. “Our team confirms the **sequence** we will use, and we break down, or decompose, each element into specific tasks. We use a flow chart to show how our algorithm will work. Then we start to use **code** to tell the computer what specific actions to perform and when to perform them. She asks the class, “What is the first thing you would tell the computer to do in your program?”

Margo suggests that they should ask for the student’s grade. Mrs. Hale asks if students would need to enter their grade or if there would be a way for them to choose their grade. Matthew says, “A menu!” Mrs. Hale says, “That’s a great idea, Matthew. Your code could tell the computer to display a menu of grades when the user clicks on the Grade box.” The class talks about the other variables, such as Book Title, Author, and Reading Level, and how they could code the computer to capture that information.



Vocabulary

sequence, n. the order in which steps occur

code, n. a system of symbols that tell meaning or give instruction

Mrs. Hale says that programming can take a long time but that there are many tools she and her team can use to make it go faster. She asks the class to share a task they repeat each day. Some of the students reply, “Brushing my teeth” and “Making my bed.” Mrs. Hale tells the class about **loops**.

Whenever a computer programmer sees a task that gets repeated, they can code a loop to tell the computer to repeat the sequence instead of programming the individual steps each time.

When a programmer needs to tell the computer to do something when an action takes place, such as a specific screen appearing when a computer is powered up, it is called an **event**. When a programmer needs to make something happen if something else happens first, such as a star appearing when a certain level is reached, it is called a **condition**.

Vocabulary

loop, n. a sequence of instruction which continually repeats until a certain condition is reached

event, n. an action or occurrence that can be identified by a computer program, such as a keystroke or a program opening up

condition, n. an instruction for a computer to execute certain actions if certain criteria are met

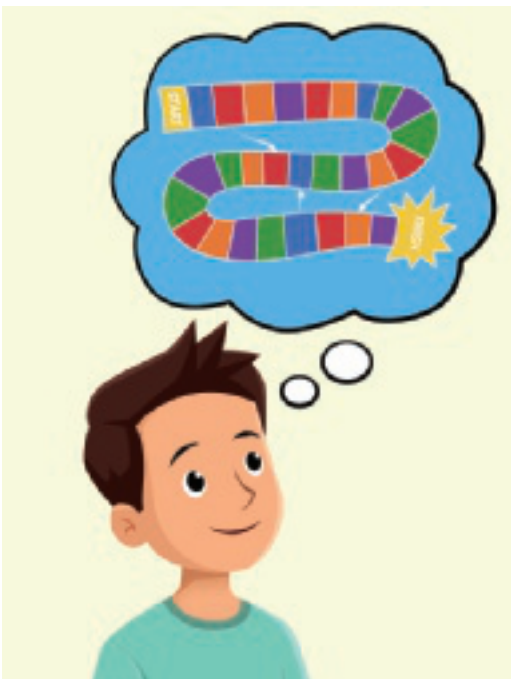


Mrs. Hale says, "It also saves a lot of time when we use code we have already written for another purpose." Adam raises his hand and says, "We could ask for game title and age range instead of book title and reading level if we are playing games with our buddies." Mrs. Hale loves this idea. She says, "Yes, you would be using an existing program in a whole new way!"

Mrs. Hale continues, "When we develop programs, we often realize how many new things we want our software to do. It is exciting to add on or remix the code to accomplish new tasks and make the code more useful. Can you think of other features that will be useful to add to your reading log program?" Jolie raises her hand and shares her thought of adding a place where the first graders can type in their own stories, which could help their writing skills. Mrs. Hale agrees.

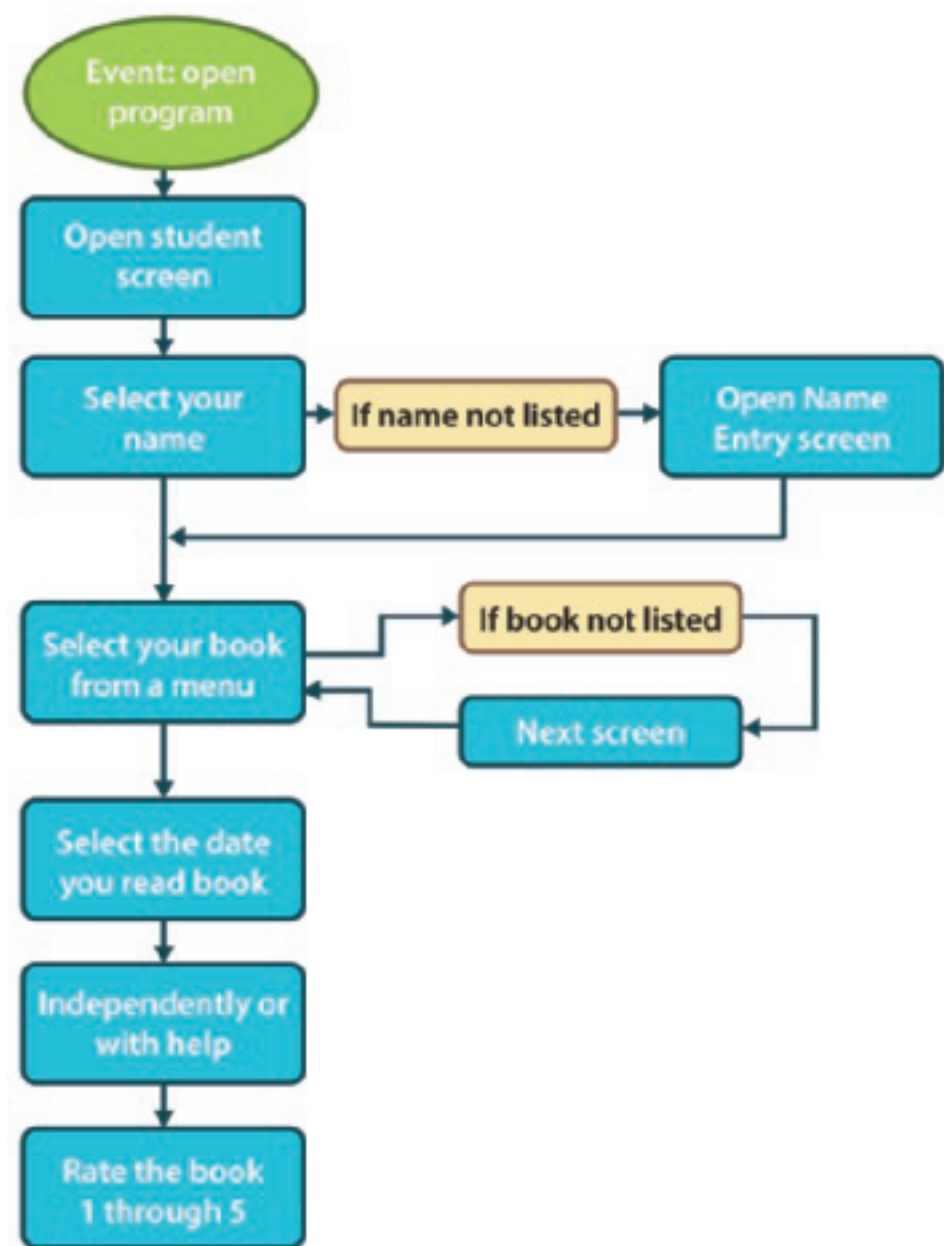
Word to Know

To *remix* is to create a different version of something by adding, removing, or changing pieces of it.



Look closely at this possible reading log algorithm.

- How many loops can you identify?
- How many conditions?
- How many events?
- Is there anything you would change to make the algorithm more efficient?



Testing and Usability

Chapter

7

Mrs. Hale tells the class that once her team has completed their code, the next step in the development process is to begin **testing** the program. “We want to be sure the program functions like it is supposed to,” she explains, “so we try out many different scenarios to see if they all work.” She shares an example with the class. “When we were building a computer program for ordering groceries, we realized in testing that we couldn’t navigate to the snack food category when we were in the cereal category.”

Vocabulary

testing, n. a process of trying out a system to determine if it works as intended



Mrs. Hale says, “I really enjoy watching people test our programs. It helps us know what is and isn’t working in our code. We take notes and make sure we write down every time we find an issue or a user doesn’t understand something.” She asks the class, “How would you know which issues are the biggest problems so you know what needs to be fixed, or **debugged**, first?” Adam says he would mark a problem with a tally mark every time it happens so he would know which problems happen over and over again.

Vocabulary

debug, v. to identify a problem in a system, determine its source, and correct it

Mrs. Hale says that the testing team also records when users make comments about parts of the program, such as the art or particular functions. She says, “It helps all of us to know what is going well and what needs to be fixed each time we test a program!”

Word to Know

Repeated review, testing, and adjustment to improve a product or program is called an *iterative process*.



Ms. Ling asks Mrs. Hale how they make their computer programs accessible to the most people possible. Mrs. Hale says they always try to test their software with a diverse group of users. “We work carefully to make programs that can be used by people with vision, hearing, and movement impairments. We do things like increase font size and add narration or voice commands to increase **accessibility** and **usability**. We want as many people as possible to find our programs helpful and easy to use!”

Vocabulary

accessibility, n. the degree to which a program can be used by the greatest number of people with the widest range of differences

usability, n. the degree to which a program is easy to use



Respecting Copyrights

Chapter

8

Mrs. Hale wants to show the class some of the computer programs her team has worked on. She demonstrates a tool they built to help people find art stores in their area. She also shows them the grocery ordering app. “No matter what the program is for,” she says, “all of our teams need to be sure we are using only legal materials in our program.”

She asks the class, “If you draw a really cool dog, would you want others to use your drawing without asking you?” All the students shake their heads no. “That’s right,” she continues. “If you draw the dog, you have the right to decide whether or not to let others use that image. This is called **copyright**.”

Vocabulary

copyright, n.
the protection of a person’s or company’s creative ideas from use by others without permission



Ms. Ling joins in with Mrs. Hale and explains, “Stealing doesn’t just apply to objects. It also applies to words, images, and ideas. If you want to use the work of someone else, you need to be sure to get **permission** from them first.” She asks them to reflect on how it would feel to see a drawing they created used in someone else’s story or presentation. “It would feel wrong if they never asked for your permission—wouldn’t it?”

Mrs. Hale also tells the class how important it is to give appropriate **credit** when they are using material that has been created by others. She shows the students the credits screen in one of her demo programs. “Look at how many people it took to create this program!” she points out. “Everyone worked hard and deserves to be credited for the role they played in the development process.”

Vocabulary

permission, n. an official statment allowing somone to do something

credit, n. recognition of the person who originally came up with an idea or made a creative work



Jolie asks Ms. Ling, "If someone posts something on the internet, doesn't that mean that anyone can use it?" Ms. Ling explains to the class that some images, songs, or videos are in the public domain and are free to use without permission. "But not everything on the internet is in the public domain," she says. "You still need to give credit or get permission to use most things that others have created."

Mrs. Hale tells the students about Creative Commons media, a collection of text and images that anyone can use for free, provided they give the proper credit to the creator.

Creative Commons allows creators to grant permission to anyone to use, remix, or adapt their work in certain ways. The class is excited to see the large lists of graphics and media they can use in their own creations, provided they give the proper credit!

Word to Know

Materials that are free from copyright protection and can be republished by anyone are said to be in the *public domain*.

Rules to Remember

- 1) Finding something free on the internet doesn't mean you can freely reuse it.
- 2) You can use material that is public domain or has a Creative Commons license. But you should give credit to the original maker of the materials. You should always give credit for ideas that are not your own.
- 3) Your original work is automatically copyright protected. You can assign a Creative Commons license to it if you want to allow others to freely use it.

Using Feedback

Chapter

9

Mrs. Hale tells the class that, in addition to testing the program, getting a lot of **feedback** from others is an important part of the design process and helps improve programs. She describes how her team demonstrates their programs to people who might use their programs and asks them what they think of the art, how easy it is to use, if it is collecting the right information, and more. She asks Ms. Ling for feedback on what she wants in the reading log program.

Vocabulary

feedback, n.
reactions to a product or a performance used as a basis for improvement

Ms. Ling says she wants the program to be quick and easy for the first graders to use. She says she wants to check each student's progress to help predict who is ready to move to the next reading level or who needs more help at their current level. She says she wants to know which books are student favorites!



Mrs. Hale says that sometimes their customers have good feedback, such as a program being easy to use or being visually appealing. And sometimes they give bad feedback, such as the program being confusing or not easy to use. Either way, feedback is extremely important in making a program even better.

She asks if the class has ever done a critique. Some students raise their hands and share examples of when they have presented and given each other feedback. They all agree that as long as it is kind and respectful, a critique is really helpful.

Word to Know

A *critique* is a detailed analysis or assessment of something.



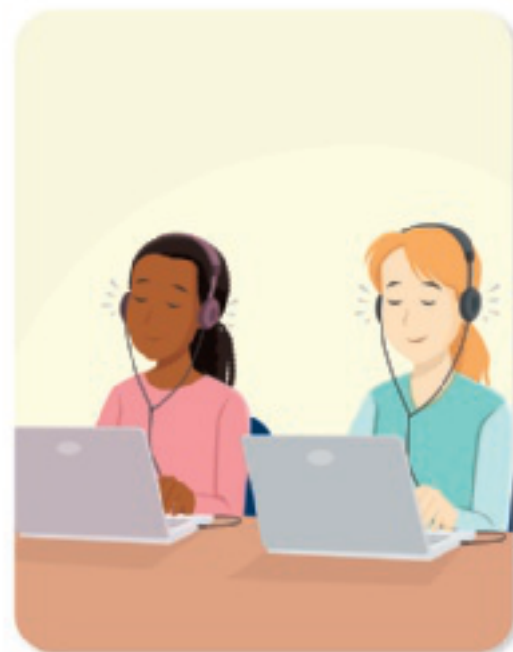
It is time for Mrs. Hale to leave. The class thanks her for all of the great information on what it takes to build a computer program. She reminds them that the process is always a bit different depending on the program being built but that the basic steps remain the same. She leaves them with one last thought: "Don't forget that teamwork is so important. Being respectful, being kind, and listening to each other make the process and the product much more successful. Our team always takes the time to **reflect** on our process and everything we have learned so we can make the next program even better!"

Vocabulary

reflect, v. to think back on something that has happened



Now you can reflect on the chapters you have read so far in this book. Which steps in their computer program design and development process are the teams shown here doing? Which parts of the process seem most interesting to you?



Computer Technology and Culture

Chapter

10

Ms. Ling asks the class to think about the programs

Mrs. Hale showed them. She asks, "How does the grocery ordering app help us?" Matthew says it helps people who cannot go out to shop for food themselves. Adam says it makes the shopping process quicker.

Mrs. Ling asks her students how their own idea to build a reading log program would help teachers. Margo raises her hand to share that the program could help teachers easily see how students are progressing and where they needed help. Jolie offers that it could help teachers see which books are engaging to students and which are not. Another student shares that it could help save trees by not using paper reading logs!



In the teacher's lounge that day, Ms. Ling tells Ms. Rivers how the buddy program inspired her class to want to create a reading log program to help keep track of the first-graders' reading progress. And with the help of Mrs. Hale, they learned more about how computer programs are built. Ms. Rivers is impressed with the fifth-graders' idea. "That could have a powerful **impact** on their learning and our teaching," she says. "Paper reading logs might become be a thing of the past!"

Vocabulary

impact, n. effect

Ms. Ling, Ms. Rivers, and other teachers talk about some of the other things they used to do in their classrooms that technology has made much easier. Mr. Haney says, "Remember when we used to handwrite twenty-five report cards? Now we just enter them into a form and email them to parents." Ms. Ferenz adds, "I know how happy parents were to be able to complete their school forms online this year."



Mr. Ortega adds, "Remember when we would have to make paper copies of everything we wanted to present? Projecting a page is so much easier and better for the environment! Online video conferencing helps us when we can not meet in person. Technology has certainly changed our **culture** both inside and outside of school, hasn't it?"

Vocabulary

culture, n. the traditions, beliefs, and behaviors of a group of people

Ms. Ling ponders, "I hope this clever group can influence other students in the school. They have really been inspired by how technology can help improve the way we do certain things. They inspire me!" When she returns to the classroom, she tells her students that she will find programming activities they can use in class to start building skills to create their own computer software someday.



Margo, Ms. Ling, and the rest of the students and adults in this story are imaginary characters. But their story tells about real-world things that computers can do. And it tells about the processes that people use when they design computer programs.

You might have experienced using computer games for learning at school or in your home.



You might also use computers in school to do class assignments.

All the programs you use for schoolwork and for fun were designed by computer programmers. And those computer programmers were once in school just like you!



If you would like to become a computer programmer, you don't have to wait until you are an adult. With the support of a teacher, a parent, or another trusted adult, you can do an internet search for the keywords "computer programming for kids." The search results will lead you to several websites where you can do online activities to learn coding and computer programming. It will set you on your way to designing your own computer programs.

Glossary

A

accessibility, n. the degree to which a program can be used by the greatest number of people with the widest range of differences

algorithm, n. steps or rules to follow to complete a specific task or to solve a problem

B

branching, adj. splitting or dividing from the main part of something

C

code, n. a system of symbols that tell meaning or give instruction

collaboration, n. working together as a team

compare, v. to note the similarities of two things

component, n. a part of a greater whole

condition, n. an instruction for a computer to execute certain actions if certain criteria are met

constructive, adj. helpful toward an improvement

control, v. to command or manage

copyright, n. the protection of a person's or company's creative ideas from use by others without permission

Creative Commons, n. an organization that documents licenses that make creative work available for others to use and share

credit, n. recognition of the person who originally came up with an idea or made a creative work

criteria, n. the conditions that a solution must meet to be judged as successful

critique, n. a detailed analysis or assessment of something

culture, n. the traditions, beliefs, and behaviors of a group of people

cybercrime, n. theft or misuse of someone else's digital data

cybersecurity, n. the protection of computers from information theft or damage

cyberspace, n. the concept of a place where all the world's interconnected digital data are stored and moving about

D

data, n. details of information collected by observation or measurement

debug, v. to identify a problem in a system, determine its source, and correct it

design, n. a plan for solving a problem that shows what the solution is intended to be like before it is produced

E

ethical, adj. correct and in accordance with rules and shared values

event, n. an action or occurrence that can be identified by a computer program, such as a keystroke or a program opening up

equitable, adj. fair for all

F

feedback, n. reactions to a product or a performance used as a basis for improvement

I

impact, n. effect

internet, n. the network of connected computers all over the world

iterative, adj. describing a process that involves repeated review, testing, and adjustment to improve a product or program

L

loop, n. a sequence of instruction which continually repeats until a certain condition is reached

M

manipulate, v. to manage or influence so a certain result is achieved

modification, n. a change or update to a design

modify, v. to change or update

N

network, n. a group of computer devices that communicate with each other

P

permission, n. an official statement allowing someone to do something

perspective, n. a persons' particular point of view or way of thinking, based on their own experiences

plan, v. a list of steps to achieve a desired outcome

prediction, n. a statement about what a person thinks will happen in the future

presentation, n. a delivery of information to other people by speaking and showing them visual aides

program development, n. the process of creating new programs for computers and electronic devices

protection, n. the act of keeping something safe and secure

public domain, n. the status of materials that are free from copyright protection and be republished by anyone

R

respect, n. regard for the rights of others and the way they prefer to be treated

refine, v. to improve

reflect, v. to think back on something that has happened

remix, v. to create a different version of something by adding, removing, or changing pieces of it

role, n. a part a person plays in a given situation; a job

S

sequence, n. the order in which steps occur

sharing, v. using or experiencing something with others

society, n. members of a community and their actions as a group

solution, n. a design that meets a need or solves a problem

storage, n. the practice of keeping information temporarily or permanently

system, n. a set of parts that work together to complete a task

T

teamwork, n. working together as a group

testing, v. a process of trying out a system to determine if it works as intended

troubleshoot, v. to identify and correct the problem in a system

U

usability, n. the degree to which a program is easy to use

V

value, n. a numerical amount; the worth or importance of something

variable, n. an element that can change based on conditions



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