Let's Clean!
A Lesson on Computational Thinking

Instructional Time:
65 minutes

Introduction

In Let's Clean, students will use design thinking and computational thinking to complete the task of cleaning a room. In this blended learning lesson, students will learn how to break a task into parts utilizing decomposition to complete the overall task of cleaning a room. Students will then have the opportunity to think through the sequence it took to complete those steps and apply their learning to another task.

This is a sample STEM Connections lesson. Please find more information at https://explore.avid.org/experience-avid/stem-connections

Essential Question

How can we use decomposition to break tasks into smaller steps to complete a task such as cleaning a room?

Lesson Objectives

Students will:
- Use decomposition to collaboratively solve the problem of cleaning a room.
- Apply their learning by sequencing the steps used to clean a room.

Materials and Resources

Resources below are available in additional formats such as Microsoft and PDF with a subscription to AVID STEM Connections. Links provided below are in a Google format. (If another format is needed, please contact cskeen@avid.org)

Hands-on:
- *Let's Clean!* Presentation
- *Messy Rooms 4 Corners* Student Resource
- *Let's Clean! Brainstorming* Student Resource
- *Sequencing Exit Ticket* Student Resource
- *Let's Clean! Digital* Student Resource
- *Let's Clean! Cut & Sort* Alternative Student Resource
- Colored Writing Utensils (crayons, colored pencils, etc.)

Minds-on:
- Computational Thinking
- Identifying problems
- Problem Solving

Design Thinking:

This lesson explores the indicated stages in the design thinking process:

- ☒ Empathize
- ☒ Define
- ☒ Ideate
- ☒ Prototype
- ☐ Test

Standards and Goals:

Common Core State Standards:
- CCSS.ELA-LITERACY.SL.1.1.B Build on others' talk in conversations by responding to the comments of others through multiple exchanges.

International Society for Technology in Education Standards:
- ISTE — 1.3d Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
- ISTE — 1.5c Students break problems into component parts, extract hey information, and develop descriptive models to understand complex systems or facilitate problem-solving.

Next Generation Science Standards:
- NGSS-K-2-ETS1 Engineering Design- Ask questions, make observations, and gather information about a situation people want to change, to define a simple problem that can be solved through the

Teacher Preparation

- Review teacher presentation slides and resources listed in the lesson.
- View the teacher resource video Best of Digital Literacy + Computational Thinking for Children to familiarize yourself with Computational Thinking as needed.
- Print *Four Messy Rooms* Student Resource and hang each image in a different part of the classroom. (1 copy)
- Print *Let's Clean! Brainstorm* Page, either the color version or grayscale version. (1 per partner group)
- Review the *Let's Clean Digital* Student Resource and edit whichever slides you may need. Backgrounds are not adjustable, but all the smaller items students need to sort can be moved around and deleted if necessary. Decide what is most appropriate for your students and classroom.
- Assign the *Let's Clean Digital* Student Resource to students in your Learning Management System (LMS) prior to class.
- Edit *Sequencing Exit Ticket* to add word bank and/or sentence stems as needed and print. (1 per student)

development of a new, improved object or tool.

UN Sustainable Development Goals:
- UN SDG 3 — Good Health and Well-being: Ensure healthy lives and promote wellbeing for all at all ages.

Essential Question: *How can we use decomposition to break tasks into smaller steps to complete a task such as cleaning a room?*

ENGAGE (10 minutes)

What makes a Messy Room? Four Corners:

Students will view a variety of messy rooms to draw on their prior knowledge of how to clean a messy room.

Display *Essential Question (Slide 2)* and read to students, choral read, or call on students to read.

Display *Messy Rooms (Slide 3)* and explain that students are going to move to different areas in the room.

Number students off 1–4 and send them to the area of the room that is labeled with one of the *Messy Rooms 4 Corners* images.

Instruct student groups to view the picture of the room hanging in their corner.

Say, "Look at the picture of the room, what do you notice?" **Ask** these questions to facilitate a discussion about the room that the students are viewing, pausing to give talk time:

- What words would you use to describe this room?
- What would happen if we just left the room the way it is?
- What would you do first when cleaning this room?

Call on students to share their answers for their room with the class.

Resources:

Let's Clean! Presentation
Messy Rooms 4 Corners Student Resource

Teacher Tip:

If the room does not allow for movement, assign each group or partners an image to look at and discuss.

EXPLORE (15 minutes)

Brainstorm — Make a Plan:

Students will view a messy room and brainstorm how they could separate the objects into different categories to know where to start.

Display *Discuss. (Slide 4)*

Resources:

Let's Clean! Presentation
Let's Clean! Brainstorming Student Resource

Ask, "Have you ever been asked to clean your room or to clean up a mess? How did that make you feel? How did you know where to start?"

Call on a few students to answer the above questions. Possible responses may be "I felt mad, it was too hard, it was too much to clean, I didn't know how, I don't like cleaning," etc.

Display *Asher's room (Slide 5)* and say **"**This is Asher's room. He was told that he needs to clean it before he can go play with his friends, but he is very overwhelmed and doesn't know where to begin."

Distribute *Let's Clean! Brainstorming* Student Resource.

Say, "Sometimes when we have a task to complete it is hard to know where to start, we can break down our task into smaller parts so that we can get it done quickly. This is called decomposition."

Ask students "How can Asher sort the items in his room to help him break this task into smaller parts?" Call on students to share their responses. Answers should include clothes, trash, toys etc.

Option 1: For students who have more independence and are able to work with a partner:

- Have students work with a shoulder partner to come up with two or three different categories.
- Students will circle items that belong in each category using different colored crayons.
- Have them make a key to label their different categories.

Option 2: For students who need more scaffolding, guide students in what to circle:

- **Say,** "First, let's circle the items that are clothes with a blue crayon. What items should we circle?" Call on students to share what they have circled.
- **Say**, "Next, let's circle the items that are toys with a red crayon." Call on students to share what they have circled.
- **Say**, "Last, let's circle the items that are trash with a brown crayon."
- **Direct** students in how to create a key to label their 3 categories.

> **Teacher Tip:**
> *If students suggest other categories, honor those categories, and have the class circle those on their brainstorm page.*

> **Teacher Tip:**
> *Choose the option that best works for your students and classroom.*

EXPLAIN (15 minutes)

Using Computational Thinking:

Students will start to sort the items in the messy room into categories.

Display *Let's Clean. (Slide 6)*

Say, "Asher's mom gave him 3 bins to help him sort items. When we sort items, we put items that are alike together."

Ask Students, "How can we separate all of these items into the 3 bins?"

Instruct students to access the digital *Let's Clean Student Resource* slide 2.

Model for students how to drag the items and place them into their bins. Bins are located in the gray space of the slides.

Allow students time to sort the items in the room into their correct bins.

Ask students, "What does not need to stay in Asher's room?" Allow time for students to answer.

Say, "The trash does not need to stay in Asher's room, he needs to take it out."

Tell students that sometimes even after items are sorted one way, they can often be sorted again.

 Ask students "Are there some items in the trash that are made of plastic or paper and can be recycled?"

Display *Let's Recycle (Slide 7)* and guide students to slide 3 of the *Let's Clean Digital* Student Resource.

Say, "We are going to separate the trash from the items that can be recycled. Items that are made of plastic and paper can be recycled so that they can be reused."

Model for students how to drag the items and place them into the trash or recycle bins. *(Slide 8)*

Have students separate trash items from recycle bin items by dragging them to the correct bin.

 Display *Sequencing. (Slide 9)*

 Say, "When we helped Asher clean his room, we used decomposition to break the task into steps. These boxes are so we can sequence our steps.

Resources:
Let's Clean! Presentation
Let's Clean! Digital Student Resource

When we sequence our steps, we list what we did first, second, third, and so on."

Direct students to slide 4 of the *Let's Clean Digital* Student Resource.

Instruct Students to drag the examples of the items they cleaned into the boxes to show what steps they took when cleaning Asher's Room.

ELABORATE (15 minutes)

Apply your learning:

Students will use the same process to sort classroom supplies.

Display *Messy Classroom. (Slide 10)*

Say, "In this picture, we have a messy classroom. What would happen if we left this classroom the way it is?"

Discuss the following questions with students, leaving time for students to think and respond.
- How can we use decomposition to help us with this task?
- How can we break this down into smaller tasks?

Say, "Work with your shoulder partner to come up with 2–3 categories to help you clean the classroom." Model for students how to label the boxes in the gray space on slide 5 with their categories.

Instruct partner groups to begin sorting the classroom items in their chosen categories. (Slide 5 of *Let's Clean! Digital* Student Resource)

Resources:
Let's Clean! Presentation
Let's Clean! Digital Student Resource

Teacher Tip:
Supply students who may need it with predetermined categories. Push students who are ready to come up with additional categories or to break large categories into smaller parts.

Supply students with a word bank to help them create their categories.

EVALUATE (10 minutes)

Explain it to a friend:

Display *Sequencing (Slide 11)* and ask, "How can we explain what we did to a friend?"

Distribute *Sequencing Exit Ticket* to each student.

Resources:
Let's Clean! Presentation
Sequencing Exit Ticket Student Resource

Teacher Tip:

Instruct students to use the sequence boxes to explain the steps they took to sort the classroom items. How would they explain it step by step to someone else? Students will draw pictures to represent each category and add words or sentences based on their abilities.

Direct students to hand up, pair up with someone who was not their partner to explain the steps they took to sort the classroom items.

Four boxes are provided on the Sequencing Exit Tickets for students who may have come up with more than three categories.

Consider providing a word bank and/or sentence stems to Sequencing Exit Ticket to support students at various levels.

VOCABULARY

- **Brainstorm:** To make a plan
- **Category:** Putting things that are the same together
- **Decomposition:** Breaking problems down into easy-to-manage parts
- **Sequence:** Putting items in order

Vocabulary slides are included in the Presentation that accompanies this lesson.

CAREER CONNECTIONS

- **Custodians:** Custodians clean houses, offices, and/or schools.
- **Professional Organizers:** Professional organizers are hired by people to help sort and organize people's homes and/or offices.
- **Sanitation Workers:** Sanitation workers help keep our cities clean by collecting trash and recycling from homes and businesses.
- **Woodworkers:** Woodworkers design and build furniture that can be used for storing items.

Career Connections slides are included in the Presentation that accompanies this lesson.

See the Occupational Handbook of the Bureau of Labor Statistics for specific career information: https://www.bls.gov/ooh/

EXTENSIONS AND MODIFICATIONS

Lesson Extension:

- Have students organize Asher's room in more detail, such as organizing his clothes into shoes, shirts, pants, and colors. This can also be done with his toys. They can be separated into books, stuffed animals, etc.
- Have students write an informational text titled "How to Clean Your Room."
- Invite the school custodian in to talk to your class about their work. Have them share about their routines and how they go about cleaning classrooms in a systematic manner. Also have the custodian share what students can do at the end of the day to make sure the custodians are able to do their job well.

Lesson Modification:

- If computers aren't available to the students, print and cut out the *Let's Clean!* Student Resource. The students can manually move the items to the correct locations.
- For students who are struggling with where to start, have them focus on one part of the room at a time such as organizing the toys.