



# CRRAFT PARTNERSHIP

SCHOOL CURRICULUM  
PHASE 1

## PHASE 1 ORDER MATTERS

Phase 1 is all about how **algorithms** are all around us in our everyday lives. As children learn new school routines at the beginning of the year, Phase 1 will help them understand **sequencing** and make connections to computer science.

### PHASE 1 POWERFUL IDEAS

**Algorithms** | **Hardware/Software** | **Modularity**  
*for more on these powerful ideas:*



You can help your students understand that routines are like **algorithms** in computer science. As children recognize **sequencing**, they come to understand that order sometimes matters in computer science and storytelling. In exploring how tasks and routines can be broken into smaller pieces, children learn about **modularity**. Through initial robotics exposures, children will learn about **hardware/software**, that is that computers run based upon interactions with humans.

### PHASE 1 LEARNING STANDARDS

PK.AL.SR.7 Reflect and plan a logical series of steps to accomplish a task, such as writing a message, completing a puzzle, drawing a picture, or building a block structure.  
PK.08 Use directions such as up, down, in front, and behind.

PK.PD.2. Demonstrate awareness of spatial boundaries and the ability to work and move within them.  
PK.SL.PK1.4 Describe familiar people, places, things, and events, and, with prompting and support, provide additional detail

### PHASE 1 GOAL

*Children will understand that using steps (as in **algorithms**) helps us do tasks & solve problems in computer science, literature, and in daily life. Sometimes the order of steps when **sequencing** matters.; other times, order does not matter.*

- Coding Cards
- Robot Mouse Game
- Code & Go Mouse
- Chart Paper
- Routine Picture Cards
- Coding Strips
- Book Making Materials
- Magna Tiles
- Focal Texts (Routines/ sequences, linear and nonlinear narratives )

### PHASE 1 MATERIALS







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### PHASE 1

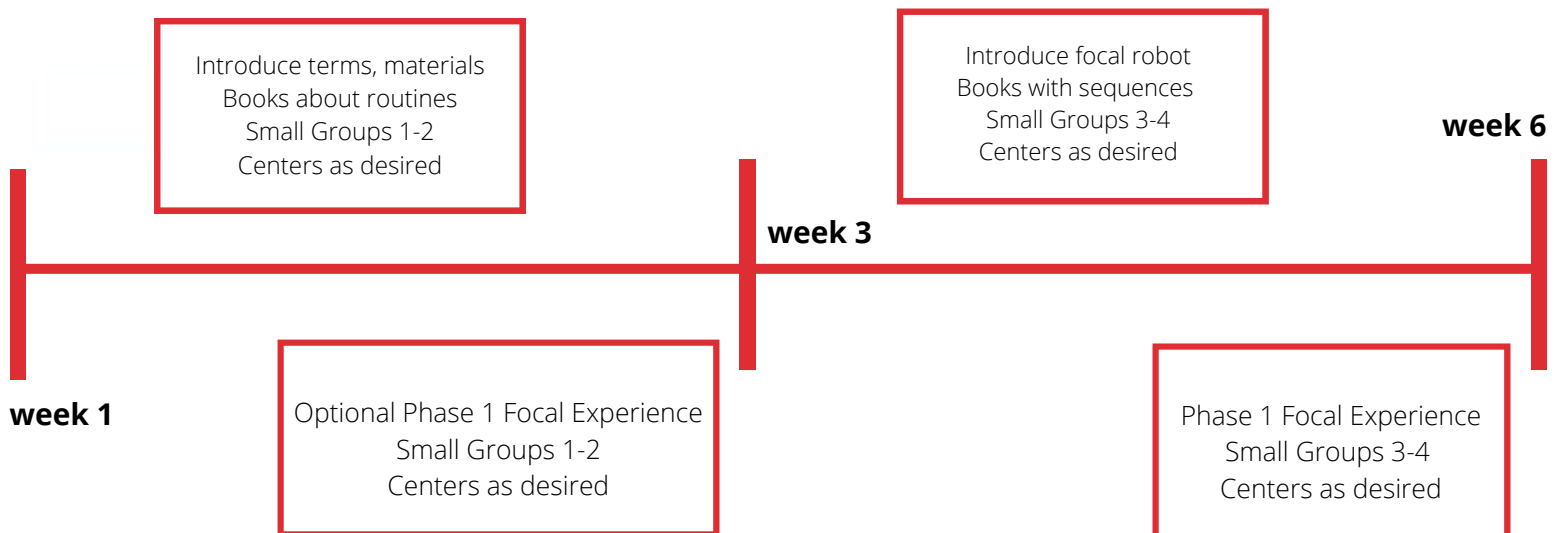
### ORDER MATTERS

## PHASE 1 OVERVIEW

Phase 1 Focal Experiences	Phase 1 Small Groups	Phase 1 Centers	Phase 1 Focal Texts
<p>Program the Day</p> <p><i>Collaborative development of daily schedule</i></p>	<p>Sequencing a Routine</p>	<ul style="list-style-type: none"> <li>Art - mazes</li> <li>Blocks - Robot Mice and accessories</li> <li>Books - Sequencing books</li> <li>Dramatic play - story props; recipes</li> <li>Puzzles/Games - Robot Mouse game</li> <li>iPad/Computer - Code-a-pillar app; PBS kids games</li> <li>Writing - Book making materials</li> </ul>	<p> <i>Otto Goes to School</i> (routines as algorithms)</p>
<p>If You Give Your Teacher a Program</p> <p><i>Story sequence recall and using "order matters" for programming</i></p>	<p>Writing a <i>If You Give a Mouse</i> Story</p>		<p> <i>Good Morning, Buenos Días</i> (routines as algorithms)</p>
	<p>Programming a Friend/ Miss Muffett</p>		<p> <i>If You Give a Mouse a Cookie</i> (sequencing)</p>
	<p>Programming the Robot Mouse</p>		<p> <i>Be Boy Buzz</i> (non-linear storytelling)</p>

## PHASE 1 TIMELINE

Each CRRAFT phase lasts approximately 6 weeks. Phases can and should overlap or be extended or shortened as needed in your classroom. This timeline is a **suggestion**.





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##### CULTURAL RELEVANCE

###### **Celebrate differences!**

Discuss at-home routines (brushing teeth, making sandwiches; driving/walking to school). Routines can vary from family to family, be sure to celebrate these differences.

Discuss why the order of steps is important in at-home routines. Consider times when the order may not matter as much. Recall algorithms for at-home tasks without actually doing them.

###### **Think about order!**

###### **Beginning-middle-end? Not always!**

Not all cultural groups use linear narrative sequences (beginning, middle, end). Nonlinear storytelling is important in cultures that feature oral narrative traditions. Honor these rich traditions by reading books with nonlinear structures (*Be Boy Buzz*, *Black and White*, *A Perfectly Messed Up Story*).

##### THINGS TO CONSIDER

Note: These are tips and tricks to get the most out of the phase

- Use a playground, not playpen approach (keep robotics play open-ended, not overly structured and teacher directed)
- Encourage children to ask questions
- Use the design process when implementing routines (identify problems and work with children to figure out potential solutions)
- Prioritize group and cooperative work

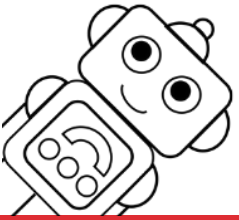
##### ESSENTIAL QUESTIONS

Note: These are not questions to answer but thematic questions that underlie the phase

What is a sequence? What is important to know about sequences?

How are coding sequences enacted (with robotics)?

How do we use sequences to make sense of the world around us? How do we make sense of sequences?



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#### PHASE 1 CENTERS

Center	Materials	Powerful Idea
Art	In art, we can <u>build mazes</u> <ul style="list-style-type: none"><li>• Laminated directional cards</li><li>• Recycled materials for maze building</li></ul>	Design Process
Blocks	In blocks, we can <u>explore Robot Mice</u> <ul style="list-style-type: none"><li>• Robot mice, directional cards, numbered velcro strips for directional cards.</li><li>• Various blocks and loose parts for students to create mazes for mice.</li><li>• Magna Tiles</li></ul>	Modularity Hardware/ Software Sequences and Algorithms
Books/ Library	In the library, we can <u>learn about sequencing</u> <ul style="list-style-type: none"><li>• Books on coding (<i>How to Code a Sandcastle</i>)</li><li>• Sequencing books (<i>If You Give a Mouse a Cookie, There Was an Old Lady who Swallowed a Fly</i>)</li><li>• Routine based books (<i>Otto Goes to School</i>)</li></ul>	Sequences and Algorithms
Dramatic Play	In dramatic play, we can <u>act out routines, recipes, and stories</u> <ul style="list-style-type: none"><li>• Dress up materials for nursery rhymes</li><li>• <i>If You Give a Mouse a Cookie</i> props</li><li>• Recipe cards and cookbooks</li></ul>	Representation
Puzzles and Games	In puzzles/games, we can <u>play a game to learn about algorithms</u> <ul style="list-style-type: none"><li>• Robot Mouse board game</li></ul>	Sequences and Algorithms Debugging
iPad/ Computer	In iPad/computer, we can <u>explore coding and learn more routines</u> <ul style="list-style-type: none"><li>• Think &amp; Learn Code-a-Pillar App</li><li>• PBS kids games (Routines Games)</li></ul>	Sequences and Algorithms
Writing	In writing, we <u>can write stories, write books, and write directions</u> <ul style="list-style-type: none"><li>• Paper and copies of directional cards</li><li>• Book making materials</li><li>• Story sequencing pages</li></ul>	Representation



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### PHASE 1 SMALL GROUPS

Small Group #1 and #2

Please collect documentation/artifacts for each small group lesson

## Sequencing a Routine\*\*

\*\* - Collect small group assessment data for all children

**algorithms** | **debugging**

Students will discuss and order the steps to wash hands

**Standard:** PK.AL.SR.7 Reflect and plan a logical series of steps to accomplish a task, such as writing a message, completing a puzzle, drawing a picture, or building a block structure.



#### Materials Needed:

Picture cards  
Access to sink, soap, paper towels.  
Paper and Crayons or pencils, chart paper  
*Otto Goes to School* (or other)

#### Instructional Steps

**I DO** Recall reading the book: *Otto Goes to School*, What did Otto do first? next? Last? Order matters.

**WE DO** Brainstorm steps to handwashing. Use picture cards. Write steps and act them out.

**YOU DO** Students act out steps and recall sequence of routine. Debug sequence and identify issue if/when teacher presents incorrect order.

#### Success Criteria

**Key Questions**  
What would you do first? Next? Last?  
What did we forget?  
What do we need to change?  
What if you dried your hands before getting soap? (more questions like this)

**M=** Student shows a strong understanding of sequence and the importance of order  
**IP=** Student shows some evidence of understanding of sequence and the importance of order  
**NM=** Student follows along, imitates and observes, but shows minimal or no understanding of sequence or the importance of order

## Write an "If" Story

**algorithms** | **representation**

Students will discuss and order the *If You Give a Mouse...* story events and write their own version

**Standard:** With prompting and support, orally retell familiar stories including details.



#### Materials Needed:

Sequencing Cards  
Paper/booklets  
Crayons  
*If You Give a Mouse a Cookie*

#### Instructional Steps

**I DO** Read the story. Demonstrate sequencing with the pictures by asking what happened 1st, 2nd, 3rd.

**WE DO** Sequence the remaining events together. Take away an event and discuss what changes.

**YOU DO** Take away a different event. Write new stories. Take dictation of stories. Reorder events to see how it changes outcomes.

#### Key Questions

What happened first? Next?  
What made him ask for the \_\_\_\_? What will he do with it?  
What would happen if the mouse didn't have any milk?  
Will this change the story?  
How do you know?

#### Success Criteria

**M=** Student sequences 3 events and predicts what would happen if we took out an event  
**IP=** Student sequences 2-3 events  
**NM=** Student listens to the story and engages with the visuals



### PHASE 1

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#### OPTIONAL PHASE 1 FOCAL EXPERIENCE

## Sequence the Day



algorithms | representation |  
control structures |

*Objective: Students will collaborate to co-construct, sequence, and represent the classroom daily schedule.*

#### Materials Needed

Routine book such as *Otto Goes to School*,  
*Hello/Buenos Días*, or another)  
Chart paper, markers

#### Standards

**PK.AL.CB.14** Demonstrate a willingness to collaborate with others to solve a problem.

**PK.W.TTP.2** With modeling, prompting, and support, use a combination of drawing, dictating, and/or emergent writing to explain information about a familiar topic or informational text.

**Key Vocabulary:** sequential words (first, then, next) • sequence • if/then • debug • order • algorithm

1

**(Re)introduce and read routine book.**  
**Talk about the book's sequence.**  
**Compare to classroom schedule.**

2

**Discuss when order does and does not matter; discuss ways that the schedule can change (contingencies).**

3

**Work with children to collectively represent the schedule through "sharing the pen."**

### Engage

*Connect to children's prior knowledge and introduce key concepts*

**"What are the components the schedule?"**

After reading or reviewing book: "What is the order of events in the book?"

"What happened 1st, 2nd, 3rd, last."

"Are there things in the book that we also do in our classroom schedule?"

**"What is the order of our schedule? What comes 1st?"**

*Link initial ideas to computer science ideas and prepare children for activity*

### Connect

**"A sequence is a set of instructions, like a schedule."**

"I want to sequence our day, let's think about our schedule."

"Sometimes order matters, but other times, it does not."

"What would happen if we did \_\_\_ first?"

What would happen if it was raining/the gym was closed? Then what would happen?"

### Explore

*Support children in participating in the activity. Ask questions and help make connections*

**"Let's write our schedule sequence together!"**

"Help me remember - What is the order of our schedule components?"

"I want you to help me represent the sequence. How can you write or draw that part of the day on our chart paper?"

"Does the order of the sequence seem correct? What do we need to change or debug?"

"Can you write the next part of the schedule?"

"What should we change to make the sequence work?"





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#### PHASE 1 SMALL GROUPS

Small Group #3 and #4

Please collect documentation/artifacts for each small group lesson

## Linear and Nonlinear

**algorithms** | **representation**

*Students will consider linear & nonlinear narratives and construct their own.*

**Standard:** PK.W.TTP.3 With modeling, prompting, and support, use a combination of drawing, dictating, and/or emergent writing to narrate a single event.

#### Materials Needed:

Familiar book (e.g., *Very Hungry Caterpillar* or other)  
Nonlinear book (e.g., *Be Boy Buzz*)  
Book making materials, markers

#### Instructional Steps

**I DO** Review the two books with children with a focus on story events and sequences. Draw attention to differences.

**WE DO** Ask children to engage with the two books and share what they notice about the differences.

**YOU DO** Ask children to craft their own narrative - either linear or nonlinear - take dictation and ask questions about their story sequence

#### Key Questions

How are these stories the same or different?  
What do you notice about the sequence in each book?  
What story do you want to tell and how do you want to tell it?

#### Success Criteria

**M**= Student notices and can verbalize difference(s) in narrative styles with support. Attempts to craft narrative with clear L/NL structure  
**IP**= Student notices but may not be able to verbalize difference in styles. Attempts to craft narrative, may not have clear L/NL structure.  
**NM**= Student follows along, imitates and observes.

## Mouse Program

**algorithms** | **hardware/software**

*Students will explore Robot Mouse and program the mouse to get the cookie.*

**Standard:** PK.AL.SR.7 Reflect and plan a logical series of steps to accomplish a task, such as writing a message, completing a puzzle, drawing a picture, or building a block structure

#### Materials Needed:

Directional cards and velcro code placards  
Cookie (or another "goal" item for the mouse to reach)  
Journals and Crayons for after the lesson  
Child-created *If You Give a Mouse...* books (SG#2)

#### Instructional Steps

**I DO** Recall the sequencing stories created in SG #2. Recall what a sequence and program are. Review directional cards.

**WE DO** Open exploration of Robot Mouse. Collaborate to move Mouse in particular ways. Discuss how and why he moves.

**YOU DO** Work together to program mouse to goal item (cookie or other). Use directional cards to represent program. Debug as needed.

#### Key Questions

What needs to come next?  
Did the code work?  
How could we debug it?  
How does the mouse know what to do?  
What do you think this button will do?

#### Success Criteria

**M**= Student contributes to mouse coding. Attempts to debug independently.  
**IP**= Student contributes but needs teacher help to debug.  
**NM**= Student follows along, imitates and observes and needs help from peer/teacher.



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#### FOCAL EXPERIENCE

## Program the Teacher **algorithms** | **debugging** | **modularity** |

*Objective: Students will work together to develop a program to code their teacher to move to achieve a particular goal.*

#### Materials Needed

*If You Give a Mouse a Cookie*

Foam Mats

Directional Cards

#### Standards

**PK.AL.SR.7** Reflect and plan a logical series of steps to accomplish a task, such as writing a message, completing a puzzle, drawing a picture, or building a block structure.

**PK.AL.SR.6** Persist in solving a problem or question, with adult prompting.

**Key Vocabulary:**

- sequential words (first, then, next)
- directional terms (l, r, forward, back)
- program(mer)
- order
- algorithm

1

**(Re)introduce sequences and programs. Discuss what happens when the order changes.**

2

**Compare narrative sequences to programs and introduce "Program the teacher".**

3

**Ask children to collaborate on a program to move you toward a particular goal or objective.**

### Engage

*Connect to children's prior knowledge and introduce key concepts*

**"How do you bake cookies?"**

"Baking cookies you first need certain ingredients/materials"

"Then you need to figure out what goes 1st, 2nd, 3rd, last."

This is your recipe."

"Writing a code is like writing a recipe. When we write a recipe for a computer to follow, it's called an algorithm."

*Link initial ideas to computer science ideas and prepare children for activity*

### Connect

**"An algorithm is like giving directions."**

"I might say 'stand up, turn around, and sit back down."

That would be a set of directions or an algorithm."

"With computers, we have to be careful because whatever directions we give, the computer will follow."

"One way to give good directions is to use coding cards..."

### Explore

*Support children in participating in the activity. Ask questions and help make connections*

**"Let's create an algorithm that moves me to the X."**

"Let's use the coding cards to create some directions or an algorithm. What happens when we use this (-->) coding card?"

I want you to be programmers and use the coding cards to move me to the goal."

"Just like with baking cookies, our algorithm is going to help us achieve a goal."

"Where would I move if we used this algorithm?"

"What should we change to make the sequence work?"





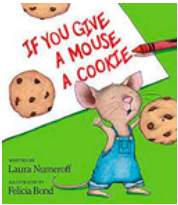
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## PHASE 1 TEXT CONNECTIONS

Text Title	Connection to Phase and Powerful Ideas	Possible Extensions	Questions (before, during, and after reading)
<p><i>Otto Goes to School</i></p> 	<p>Otto explores the routine of a school day. This book explores <b>sequences and algorithms</b> - how one activity and component of the daily schedule leads to the next and how the order of events is important in this book.</p>	<p>Book making activity to explore children's own experiences in school. Provides an opportunity to share with families what they do during the day at school.</p>	<p><b>Before:</b> I see Otto is at school. I wonder... what do you think is something that we do at school that Otto might do at his school?  <b>During:</b> What do you think Otto will do next? How do you know?  <b>After:</b> Who can help me remember the <i>sequence</i> of Otto's day? Let's write it down!</p>
<p><i>Good Morning, Buenos Dias</i></p> 	<p>This book is about the routines that happen in a family in the morning. It can be used to reinforce <b>sequences and algorithms</b> and discuss <b>modularity</b> in breaking routines into smaller pieces.</p>	<p>Talk about routines that happen in the classroom and at home.          Perform a task in sequence (e.g. hand washing) talk about what might happen if the steps are done out of order.</p>	<p><b>Before:</b> I see a picture of the sun. I wonder what might happen? I wonder what part of the day this book is going to be about?  <b>During:</b> What is the next thing that will happen in the routine?  <b>After:</b> What types of things do you do in the morning before you come to school? Let's write them down.</p>
<p><i>If You Give a Mouse a Cookie</i></p> 	<p>This book features sequential events. This can be used to stress the importance of <b>sequences</b> and to begin to look at the concept of <b>control structures</b> in that events are dependent upon what happened before.</p>	<p>Have a coding scavenger hunt where children lead each other to specific locations in the classroom or school building using directional words.</p>	<p><b>Before:</b> Make predictions based on cover and title.  <b>During:</b> What do you think the mouse will ask for next?  <b>After:</b> What would happen if you forgot to open the refrigerator before you got the milk for the mouse? What would happen if the boy forgot to get a glass and he poured the milk? What happens if you change the order?</p>
<p><i>Be Boy Buzz</i></p> 	<p>This book is about the joys of being a boy but does not follow a linear structure. This can be used to talk about <b>algorithms</b> and how order does not always matter.</p>	<p>Do a book comparison between this book (nonlinear) with books with a clear sequence (like <i>If You Give...</i> and <i>There Was an Old Lady...</i>) and discuss the differences.</p>	<p><b>Before:</b> What are some different feelings you have?  <b>During:</b> What is happening on this page? What do you think will come next?  <b>After:</b> What do you think was the beginning, middle, and ending of this story? What is the sequence of the story?</p>



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### OTHER POSSIBILITIES

*This list contains other possibilities and extensions, small groups and centers, and large group opportunities that were not developed as a part of the CRRAFT program but could be used in this phase.*

### LARGE GROUP IDEAS

- Introduce screen-free robots, like Code & Go Robot Mouse or Code-a-pillar in large group. Set norms/expectations and discuss use. You can use this as another opportunity to focus on routine as a "program" by establishing an organization system for how students take out, use, and put away the robots.
- Introduce the idea of programming language, as compared to written and spoken languages. Remember that written language may be new for many of your students, especially for children from homes, cultures, and communities with strong oral traditions.

### SMALL GROUPS AND CENTER IDEAS

- Program a routine. For example, children draw steps and sequence them for a common routine, such as hand washing, getting ready for a meal, etc. Use this time to learn about students' routines at home. Celebrate differences across families.
- Routine/transition sequencing. For example, you can use printed pictures and have children sequence pictures. These can be school routines or home routines.
- Recipe reading in dramatic play. For example, the sequence of steps in recipes matters, include recipe cards or cookbooks in dramatic play and discuss this during.

### EXTENSIONS

- Embed **algorithms and sequences** into things you already do - like in songs and dancing
- Discuss robot functions for those in the classroom and not (e.g., phones, computers, vacuums, etc.) to emphasize **hardware/software**
- Provide opportunities to see **modularity** in play - take larger art or block projects and break into smaller pieces

### OTHER TEXTS

