



# Examining Dash and Dot for Accessibility

## A Guide of Considerations for Educators

This framework is intended to support educators as they explore and consider appropriate activities for coding instruction with their students who experience learning challenges. The considerations outlined below are based on Dash and Dot, as they are shipped from the manufacturer. Materials in this Accessible Coding Kit were created to attempt to decrease these barriers.

**NOTE:** At the time this table was written, the Blockly app was supported on a variety of iOS and Android devices and on a Chromebook. Wonder Workshop continues to develop for a variety of platforms that should be considered when examining accessibility.

### Accessibility Considerations:

Potential Barrier	Severity of Barrier Least (0 - 5) Most (How inaccessible does this make it for your students?)	Additional Information (App details, AT Tools, Instructional Strategies, Modifications)
<b>Reading</b>		
There are text instructions that require reading (i.e. are not presented auditorily or supported by images).	0	Not Applicable
Text is used to label/categorize and is not accessible auditorily or supported by images.	5	iPad - Categories and labels are not accessible in auditory format or supported by images in the Blockly app. Reading text would also be helpful when setting parameters. Voice over is available for students who are blind or have low vision. Chromebook - Use Select to Speak - requires dexterity; Select to Speak icon needs to be selected prior to each text selection. Reads When Start button under the first block in the category.
There is challenging vocabulary used that is not explained.	3	During instruction, teachers will need to explicitly teach coding vocabulary. When students are using the app independently, there are no explanations and few images to support them.
There are tooltips/hints that require reading (i.e. are not presented auditorily or supported by images).	0	Not Applicable

<b>Writing</b>		
Students are required to type correctly spelled commands in order to carry out tasks.	0	Not Applicable
Students are required to compose sentences to program a storyline (i.e. character conversation)	0	Not Applicable
<b>Speaking</b>		
Students are required to speak clearly in order to add custom sounds, scripts or use voice commands.	1	Use of custom sounds is limited to one block.
<b>Cognitive</b>		
Students are required to store information and recall it later to carry out a task.	0 - 2	Dependent on whether the activity is exploratory or a prescribed task, typically provided by teacher/facilitator.
Students are required to follow a large number of steps sequentially that are not broken down.	1 - 4	Dependent on whether the activity is exploratory or a prescribed task, and the complexity of that task, typically provided by teacher/facilitator.
Students are required to have an understanding /prior knowledge of certain concepts in order to carry out tasks. (i.e. left/right, sequencing)	3 - 4	Concepts of direction (i.e. left, right, up, down), degrees, time, speed and sequencing are basic requirements. More complex concepts are an understanding of repeated patterns, if/then language, etc..
Students are required to follow fast paced instructions.	0	User is not required to complete a task within set time-frame.
Students are required to follow instructions that are provided auditorily but not visually.	0	Not Applicable
Students are required to navigate across multiple screens.	3	Users are required to attend to the app and the movement/actions of the robot.
Students are required to orient self in relation to objects (i.e. what is forward for me compared to what is forward for the robot)	3	Users are required to recognize the location and orientation of the robot in relation to self and in relation to other objects.



<b>Visual Perceptual</b>		
Students are required to have good spatial awareness to carry out the task.	3	Users are required to have an awareness of spatial directions of the robot in the environment and between the robot and other objects in the environment.
Students are required to understand ratios or relationships of size, distance etc.	1	Users are required to perceive size, distance and angles that pertain to the task.
Students are required to transfer their understanding of concepts from different perspectives and/or planes.	0	Not Applicable
Students are required to sort through and focus attention on several icons and features on a single page and discriminate between similar images.	3 - 4	Blockly app: sort through categories, then through blocks within a category and finally, through parameters. Visual clues in the Event images, in particular, will require explicit instruction in order to determine their meaning.
Students are required to perceive and recognize colours.	2	Commands are categorized using colour. The lights on the robot are also a range of colours. Specific colours (like red-green) would be difficult to distinguish for someone with colorblindness.
Students are required to scan field of view and see all relevant aspects.	2	Users are required to focus only on objects in the environment relevant to the program. Users are required to follow changes in features on the robot (e.g. light changes) that occur at a fast pace.
<b>Sensory</b>		
Students are required to work with soft/smooth surfaces	0	Not Applicable
Students are required to hear sounds.	3	This depends on the programming. Sounds are difficult to hear in a busy environment.
Students are required to see movement of Dash.	4	Dash is meant to be used in an open environment. Dash could be contained within a specific area, allowing for tactile monitoring of its movement.



<b>Fine Motor</b>		
Students are required to move items seamlessly using a small, single point of contact (i.e. finger)	3 - 4	All commands require use of touchscreen and drag-and-drop on a tablet. On iOS 13 on an iPad or on a Chromebook, alternate pointing devices can be used. Using a pointing device is more cognitively demanding than direct touch.
Students are required to manipulate small objects in close proximity.	3	Small objects on the screen require manipulation.
Students are required to effectively use a mouse or touchpad (i.e. for scrolling, clicking and dragging)	0 - 3	Chromebook users: Students are required to use a mouse or touchpad on a Chromebook that does not have a touch screen.
Students are required to perform complex gestures to carry out tasks. (i.e. pinch, 3 finger tap)	0	Not Applicable
Students are required to put together small pieces of machinery.	0	Not Applicable for these lessons. Required if using accessories.
Students are required to use small tools.	0	Not Applicable
Students can use alternate access devices for keyboard and mouse functions.	0/4	Different options for iPad vs. Chromebook. Older iPads that cannot be upgraded to iOS 13 do not accommodate alternate mouse access.
<b>Gross Motor</b>		
Students are required to get up and move at any point.	3	Users must be able to follow, pick up and move Dash.
Students are required to lift up the coding materials at any point.	0	Not Applicable
Students are required to use two hands at once.	2	Bimanual hand activity is recommended to pick up Dash. No bimanual hand activity is required to pick up Dot.



## Potential Solution Ideas:

Reading	Writing	Cognitive	Visual Perceptual	Fine Motor
Text to Speech Tools	Word Prediction Tool	Visual representation of steps	Adapt abstract materials to make them more concrete	Use of stylus
Language Supports (e.g. dictionary, text leveling)	Speech Input Tool	Checklists	Visual replicas of materials to isolate concepts (e.g. target cards)	Modification of selection tool
Word Wall with Symbols	Option cards	Picture Supports	Manipulatives (i.e. ribbon, blocks, stickers)	Adjustment of accessibility settings
Colour Coding	Scribing (via speech, pointing, partner-assisted scan)	Thoughtful lesson progression that includes: Anchor Activity Model Guided Practice Repetition with Variety Application Reflection	Directionality - bridge the gap between person and objects through physical orientation (i.e. identifying left/right of an object facing a different direction)	Gesture creation
	Alternate Keyboard	Adapt physical materials (labels on device - left, right)	Hide/show items in a visual interface to declutter, increase visual attention	Use of external alternate access devices
		Provide replicas of materials to isolate concepts		Partner assisted scanning
		Hide/show items in a visual interface to declutter, increase visual attention		Modification or adaptation of concrete manipulatives

**\*\*\*NOTE:** Be sure to check the compatibility of a student's current support products with the coding application(s) being considered. Also consider whether the use of the products requires instruction prior to expecting them to support coding instruction.