# BJC Sample Lab Adjustment Recommendations

**Guide Overview:** This resource guide **provides teachers** with research-derived recommendations they can use in their CSP class to improve accessibility of the lesson for students with learning and attention disorders. The recommendations stem from what is known about the range of learning and attention disorders typical in classrooms (e.g., reading, written expression, language, math, attention) and the types of adjustments commonly made to support students who learn differently because of these disorders in any discipline.

**Adjustment Terminology:** This guide includes two types of adjustment recommendations: **adaptations** and **accommodations**. The term **"adaptation"** refers to instructional practices that can be used whole-class (to benefit students with learning and attention disorders, and potentially all learners in the classroom). The term **"accommodation"** refers to differentiation for individual students based on their unique learning needs beyond what the whole-class practices provide. Many of the "adaptations" are akin to Universal Design for Learning (UDL) strategies that emphasize how information is presented, how students demonstrate understanding, and how students interact and engage with materials. However, these recommendations were specifically designed to address the needs of students with diagnosed learning and attention disorders.

**Learning and Attention Disorders:** The guide identifies the learning and attention disorders that each recommendation addresses. The list of broad disorders and sub-disorders listed on page 3 in **Table 1** are representative of the range of disorders in the general population as identified by the research team learning specialists. The adaptations and accommodations commonly made for these learning differences in any discipline inform the recommendations below.

**Learn More about Instruction for Students with Learning & Attention Disorders**
Find ways to collaborate with your school's Special Education personnel (Department Heads, paraprofessionals, school psychologists, etc.) to generally benefit from their expertise and perspective. These specialists may also be able to help you navigate any unfamiliar or unclear information contained in a student's Individualized Education Program (IEP) or a 504 plan (legal documents that outline supports that schools and teachers must provide for students with disorders that impact their learning, beyond the recommendations here).

Table 1. **Broad Learning and Attention Disorders**

| Specific **Learning Disabilities** and **Attention Deficit Disorders** | Sub-Disorders |
|---|---|
| **Reading** Disorders – All (*Adjustment applies to all types of reading disorders*) | <ul><li>Reading decoding</li><li>Reading fluency</li><li>Reading comprehension</li></ul> |
| **Written Expression** Disorders – All (*Adjustment applies to all types of written expression disorders*) | <ul><li>Spelling accuracy</li><li>Grammar and punctuation accuracy</li><li>Clarity or organization of written expression</li></ul> |
| **Math** Disorders – All (*Adjustment applies to all types of math disorders*) | <ul><li>Number sense</li><li>Memorization of arithmetic facts</li><li>Accurate or fluent calculation</li><li>Accurate math reasoning</li></ul> |
| **Attention** Disorders - All (*Adjustment applies to all types of attention disorders*) | <ul><li>Combined presentation (inattentive & hyperactive/impulsive)</li><li>Predominantly inattentive</li><li>Predominantly hyperactive/impulsive</li></ul> |
| **Language** Disorders – All (*Adjustment applies to all types of language disorders*) | <ul><li>Reduced vocabulary</li><li>Limited sentence structure</li><li>Impairments in discourse</li><li>Social pragmatic communication</li></ul> |

**Underlying Processes:** In our work, we address not only the broader diagnostic information in Table 1, but also the basic, psychological processes underlying the disorders that can make certain activities common in CS and non-CS classes challenging (Table 2). This is because two students may both have a disorder in reading that, due to the different underlying processes that contribute to the disorder, call for different kinds of actions to address the disorder. A student with a learning disorder may also have an interference with more than one of the processes listed in Table 2. Therefore, it is important to remember that, like students as a whole, those with diagnosed disorders are also very heterogeneous.

The recommendations for teachers in this document identifies both, the **broader disorders** (Table 1, first column) and in some lessons, the **underlying psychological processes** (Table 2, column 2). Each disorder category is named (e.g., "Reading"); in some lessons, underlying processes are denoted with a number (e.g., "listening comprehension" is "6"). These processes were sorted into groupings ("Clusters") by the research team learning specialists that roughly represent similar types of processing issues.

Table 2. **Underlying Process Clusters**

| Processes related to… | Underlying Psychological Processes |
|---|---|
| **Aspects of reasoning** | • Verbal reasoning (1)<br>• Visual-perceptual reasoning (2)<br>• Higher-order reasoning (3)<br>• Cognitive flexibility (4)<br>• Cognitive reasoning (29) |
| **Areas of language** | • Vocabulary/semantics (5)<br>• Listening comprehension (6)<br>• Following oral directions (7)<br>• Oral formulation (8)<br>• Retrieval fluency (9)<br>• Phonological awareness (10)<br>• Language processing (11) |
| **Different types of memory** | • Verbal memory (12)<br>• Visual memory (13)<br>• Working memory (14)<br>• Procedural memory (15)<br>• Sequential memory (16) |
| **Fine motor** | • Fine motor (17) |
| **Processing, timing and pacing** | • Processing speed (18)<br>• Sustained tempo (19) |
| **Aspects of visual processing** | • Visual pattern recognition (20)<br>• Visual-auditory learning[1] (21)<br>• Visual discrimination (22) |
| **Executive functioning,[2] attention and social skills** | • Sustained focus & alertness (23)<br>• Self-monitoring (24)<br>• Planning (25)<br>• Activation initiation (26)<br>• Metacognition (27)<br>• Social skills (28) |

[1] Also linked to the "language" cluster
[2] A weakness in some mental skills related to planning, organizing, and prioritizing. Challenges in these areas are often associated with learning and attention disorders.

# BJC Unit 1 Lab 3: Modern Art with Polygons

**Adjustment Suggestions**

<u>Suggestion 1</u>

**Lesson section:** Student Materials – Student programming instructions (throughout the lesson)

**Task description:** Students read information and instructions regarding programming geometric shapes with no verbal instruction from the teacher.

**Some students may have difficulty:**
- reading and comprehending dense and/or complex text providing information and instructions for programming (Reading, Language, Attention, 1, 2, 4, 5, 14, 15, 20, 23, 24)
- recalling or retrieving terminology, concepts, and block functions presented previously to apply to current work (Language, Attention, 1, 2, 5, 12, 13, 14, 15, 16, 20, 23)
- moving between two windows on the computer: one with the instructions and the other in Snap! where the instructions need to be executed (Language, Attention, 7, 11, 13, 14, 16, 20, 23, 24, 25)
- locating programming blocks, knowing their functions, identifying and using appropriate variables, and using visual cues from blocks to determine how they are linked together (Attention, Math, 2, 4, 13, 20, 22, 23, 24)
- planning and determining approach towards the independent work time, using a systematic approach while also self-monitoring (Attention/Executive Functioning, 4, 14, 23)

**Teacher adjustment recommendations - adaptations:**
- At the start of each section, project the instructional pages and take time to explicitly review, read aloud, and summarize main objectives, vocabulary, concepts and student programming activities as a group. (helpful for student challenges related to: Reading, Language, Attention, 1, 2, 4, 5, 10, 14, 15, 20, 23, 24)
- Identify previously learned terminology, concepts and block functions that students will need to use in the present activity and review these as a class prior to each section. (helpful for student challenges related to: Language, Attention, 1, 2, 5, 12, 13, 14, 15, 16, 20, 23)
- Create and provide reference documents that contain guidelines regarding the various blocks' function and their associated variables and location within Snap! (helpful for student challenges related to: Attention, Math, 2, 4, 13, 20, 22, 23, 24)
- If possible, instruct one student in each pairing to display the BJC instructions on his/her computer while the other student has Snap! opened on his/her computer. Or, project the instructions from the BJC student materials so that it can be viewed by the whole class while students work on their computers in Snap! (helpful for student challenges related to: Language, Attention, 7, 11, 13, 14, 16, 20, 23, 24, 25)
- Circulate and assist students experiencing difficulty determining how to approach their independent programming; explicitly provide guidance regarding systematic strategies for working through the tasks and assist students in monitoring their work. (helpful for student challenges related to: Attention)

**Teacher adjustment recommendations - accommodations:**
- ➤ Read the instructions aloud to students or allow students who need to text-to-speech software to use it (helpful for student challenges related to: Reading, 10)

<u>Suggestion 2</u>

**Lesson section:** Student materials – Exploring Motion, page 1

**Task description:** Students are introduced to the term "algorithm" via written text. Working with a partner, they read instructions guiding them through first, creating an algorithm in Snap! and then experimenting with the variables in the algorithm.

**Some students may have difficulty:**
- understanding the term "algorithm" by reading the definition and explanation without verbal input from instructor (Reading, Language, Attention, 1, 5, 11, 23)
- working with a partner collaboratively and communicating in a supportive manner (Language, Attention/Social Skills, 5, 8, 9, 11, 23, 28)
- recalling, understanding, and applying mathematical concepts, principles and processes (e.g., degree rotations and the coordinates x, y) (Math, 2)
- identifying and using block commands and variables (Related to challenges in visual processing that are often associated with Reading and Math, 16, 20, 22)

**Teacher adjustment recommendations - adaptations:**
- ➢ Discuss the term "algorithm" as a class and provide additional explanation of the term; check for understanding. (helpful for student challenges related to: Reading, Language, Attention, 1, 5, 11, 23)
- ➢ Place students in partnerships that will be supportive of learning differences. Consider the following characteristics: ability to follow directions, work speed, and attitude. (helpful for student challenges related to: Language, Attention/Social Skills, 5, 8, 9, 11, 23, 28)
- ➢ Explicitly state that students will work together and problem-solve together. Provide guidelines for how students should work together and provide feedback as they work. Possible guidelines may include: one person speaking at a time; everyone accepts feedback; everyone actively listens, etc. (helpful for student challenges related to: Language, Attention/Social Skills, 5, 8, 9, 11, 23, 28)
- ➢ Point out the differences between the blocks and why some fit well with each other and others do not. (helpful for student challenges related to: visual processing issues that are often associated with Reading and Math, 16, 20, 22)

**Teacher adjustment recommendations - accommodations:**
- ➢ Review coordinates (x, y) and degree rotation and how this applies to the algorithm in Snap! (helpful for student challenges related to: Math, 2)

<u>Suggestion 3</u>

**Lesson section:** Student materials – Angles and Turning, page 2

**Task description:** Students perform experiments in Snap! to learn about sprite turning angles, which are needed for drawing polygons.

**Some students may have difficulty:**
- recalling, understanding, and applying mathematical concepts, principles and processes (e.g., "quarter turn," rotations [90, 180, 360 degrees], and fractions/division of 360 as they relate to turns) (Math, 2, 4)

**Teacher adjustment recommendations - adaptations:** none

**Teacher adjustment recommendations - accommodations:**
- As needed, review degree rotations (90, 180, 360), quarter turns, and fractions/division of 360 as they relate to turns. Demonstrate how this applies to the algorithm in Snap! (helpful for student challenges related to: Math, 2, 4)

Suggestion 4

**Lesson section:** Student materials – Blocks with Inputs, page 3

**Task description:** Students create pinwheel pictures by creating a single block with an input slot.

**Some students may have difficulty:**
- understanding the term "branches" in this context and identifying the branches on the figures shown (Math, Attention, Language, 2, 5, 20, 22, 23)
- reading and comprehending new vocabulary ("input," "parameter," and "argument") presented without teacher clarification (Reading, Language, Attention, 1, 5, 11, 23)

**Teacher adjustment recommendations - adaptations:**
- Discuss the use of the term "branches" in the current context as a class, highlighting those in the activity designs; check for understanding. (helpful for student challenges related to: Math, Attention, Language, 2, 5, 20, 22, 23)
- Provide additional explanation of the terms: "input," "parameter" and "argument" and provide concrete examples. Clarify information, as needed. (helpful for student challenges related to: Reading, Language, Attention, 1, 5, 11, 23)

**Teacher adjustment recommendations - accommodations:** none

Suggestion 5

**Lesson section:** Student Materials – Remix Your Pinwheel, page 5 & Looping with Counter, page 6

**Task description:** Students are guided to use their existing pinwheel block to make asterisk and polygon blocks and are introduced to the concepts "abstraction" and "iteration."

**Some students may have difficulty:**
- understanding mathematical concepts, principles, and processes (e.g., abstraction and how it applies to the use of the pinwheel block to make asterisk and polygon blocks) (Math, Attention, Language, 2, 5, 20, 22, 23)
- comprehending new terms introduced with limited information about their meaning ("iteration" and "infinite loop") (Reading, Language, Attention, 1, 5, 11, 23)
- viewing and comprehending the images of the forever blocks (Math, Attention, 2, 20, 22, 23)

**Teacher adjustment recommendations - adaptations:**
- ➢ Discuss the idea of abstraction as group, highlighting specific examples from the activity. As needed, walk students through the process to create an asterisk and polygon block from the pinwheel block. Give additional examples and check for understanding. (helpful for student challenges related to: Language, Attention, Reading, 1, 2, 5, 6, 11, 14, 23)
- ➢ Read the definitions of "iteration" and "infinite loop" in the student materials aloud as a class, and discuss what these terms mean. Check for understanding. (helpful for student challenges related to: Reading, Language, Attention, 1, 5, 11, 23)
- ➢ Project images created with the forever block, and point out what is being repeated and in what form. (helpful for student challenges related to: Math, Attention, 2, 20, 22, 23)

**Teacher adjustment recommendations - accommodations:** none

# BJC Unit 2 Lab 2: Using Variables and Data Structures to Make Art

**Adjustment Suggestions**

<u>Suggestion 1</u>

**Lesson section:** Student Materials – Student programming instructions (throughout the lesson)

**Task description:** Students read information and instructions regarding programming geometric shapes with no verbal instruction from the teacher.

**Some students may have difficulty:**
- reading and comprehending dense and/or complex text providing information and instructions for programming (Reading, Language, Attention, 1, 2, 4, 5, 14, 15, 20, 23, 24)
- recalling or retrieving terminology, concepts, and block functions presented previously to apply to current work (Language, Attention, 1, 2, 5, 12, 13, 14, 15, 16, 20, 23)
- moving between two windows on the computer: one with the instructions and the other in Snap! where the instructions need to be executed (Language, Attention, 7, 11, 13, 14, 16, 20, 23, 24, 25)
- locating programming blocks, knowing their functions, identifying and using appropriate variables, and using visual cues from blocks to determine how they are linked together (Attention, Math, 2, 4, 13, 20, 22, 23, 24)
- planning and determining approach towards the independent work time, using a systematic approach while also self-monitoring (Attention/Executive Functioning, 4, 14, 23)

**Teacher adjustment recommendations - adaptations:**
- ➢ At the start of each section, project the instructional pages and take time to explicitly review, read aloud, and summarize main objectives, vocabulary, concepts and student programming activities as a group. (helpful for student challenges related to: Reading, Language, Attention, 1, 2, 4, 5, 10, 14, 15, 20, 23, 24)
- ➢ Identify previously learned terminology, concepts and block functions that students will need to use in the present activity and review these as a class prior to each section. (helpful for student challenges related to: Language, Attention, 1, 2, 5, 12, 13, 14, 15, 16, 20, 23)
- ➢ Create and provide reference documents that contain guidelines regarding the various blocks' function and their associated variables and their location within Snap! (helpful for student challenges related to: Attention, Math, 2, 4, 13, 20, 22, 23, 24)
- ➢ If possible, instruct one student in each pairing to display the BJC instructions on his/her computer while the other student has Snap! opened on his/her computer. Or, project the instructions from the BJC student materials so that it can be viewed by the whole class while students work on their computers in Snap! (helpful for student challenges related to: Language, Attention, 7, 11, 13, 14, 16, 20, 23, 24, 25)
- ➢ Circulate and assist students experiencing difficulty determining how to approach their independent programming; explicitly provide guidance regarding systematic strategies for working through the tasks and assist students in monitoring their work. (helpful for student challenges related to: Attention)

**Teacher adjustment recommendations - accommodations:**
➢ Read the instructions aloud to students or allow students who need to text-to-speech software to use it. (helpful for student challenges related to: Reading, 10)

**Lesson section:** Student materials – Processing Each Item in a List, Thinking Out Loud, page 1

**Task description:** Students are introduced to a program, which takes a list of points (x and y coordinates) as input and connect the dots.

**Some students may have difficulty:**
- recalling, understanding, and applying mathematical concepts, principles and processes (e.g., the Cartesian plane, its four quadrants, and x and y coordinates which include positive and negative numbers) (Math, 2, 4)
- reading and comprehending the dialogue because of the programming details, mathematical focus, and the structure of the exchange (a "play" format) (Language, Reading, Attention, 1, 2, 5, 11, 23)

**Teacher adjustment recommendations - adaptations:**
- ➤ Review the Cartesian plane (x-y plane), the four quadrants, and coordinates (x, y) and how this applies to the algorithm in Snap! (helpful for student challenges related to: Math, 2, 4)
- ➤ Read the Thinking Out Loud dialogue aloud and pause to check for understanding regularly; rephrase and recap when needed. (helpful for student challenges related to: Language, Reading, Attention, 1, 2, 5, 11, 23)

**Teacher adjustment recommendations - accommodations:** none

<u>Suggestion 3</u>

**Lesson section:** Student materials – Processing Each Item on a List, For You To Do, page 1

**Task description:** Students follow instructions to build a block in the first For You To Do section. Next, they test and fix the example script and respond in writing to prompts about the process. Finally in the Self-Check section, students respond to a AP Exam-type multiple-choice questions.

**Some students may have difficulty:**
- comprehending the instructions presented through an animation that moves quickly (Attention, 13, 14, 15, 18, 23)
- reading and responding to questions (e.g., about the script) (Reading, Written Expression, Math, Attention, Language, 1, 5, 8, 10, 11, 14, 17, 23)
- reading and comprehending terminology and symbols related to programming blocks and how they relate to the AP Pseudocode (Reading, Language, Attention, 1, 2, 5, 10, 14, 15, 20, 21, 23)

**Teacher adjustment recommendations - adaptations:**
- ➤ Project the animation for the whole group, view it several times, and pause frequently to permit students to execute the steps in Snap! (helpful for student challenges related to: Attention, 13, 14, 15, 18, 23)
- ➤ Read the For You To Do questions aloud as a group and check for student comprehension. (helpful for student challenges related to: Reading, Attention, Language, 1, 5, 11, 14, 23)
- ➤ Provide a list of the learned block codes in Snap!, their labels and their associated variables, and within the list, detail how the AP Pseudocode is used to represent the same commands with examples and explanations. Review with students, provide additional explanation, and check for understanding. (helpful for student challenges related to: Reading, Language, Attention, 1, 2, 5, 10, 14, 15, 20, 21, 23)

**Teacher adjustment recommendations - accommodations:**
- ➤ Circulate while students are writing the For You To Do responses and assist those that are having difficulty phrasing their thoughts. Model phrasing and for students who experience significant difficulty, or provide alternative ways to respond (e.g., provide multiple choice options for students to identify the choice(s) that best represents their experience or thinking). (Language, Written Expression, Attention, 1, 5, 8, 11, 14, 23)
- ➤ Allow students to use dictation software with the For You To Do questions, if necessary. (Written Expression, 17).
- ➤ For students who need assistance reading and comprehending the Self-Check questions, read them aloud, check for understanding, clarify when needed. (helpful for student challenges related to: Reading, Language, Attention, 1, 5, 11, 14, 23)
- ➤ Allow students to text-to-speech to read or reread any questions, if necessary. (helpful for student challenges related to: Reading, 10).

<u>Suggestion 4</u>

**Lesson section:** Student materials – Abstract Data Types, page 2

**Task description:** Students are introduced to *data types*, *primitive data types*, and *abstract data types*. Next, they create an abstract data type point (ADT), debug, and use.

**Some students may have difficulty:**
- understanding new terminology (*data types*, *primitive data types*, and *abstract data types*) presented as dense written text and visuals in varied formats (informational and play dialogue, visual representations of code containing numeric values) (Reading, Math, Attention, Language, 1, 2, 5, 11, 14, 20, 22, 23)
- identifying and using block commands and variables; understanding the block commands, their features, their names, and how they relate to one another (Related to challenges in visual processing that are often associated with Reading and Math 16, 20, 22)

**Teacher adjustment recommendations - adaptations:**
- ➢ Project page 2 and read aloud the introductory information as a class. Discuss content; assist students in comprehending the dialogue among the fictional students, review x, y coordinates and the new terminology, and walk them through the process for creating the abstract data type script. (helpful for student challenges related to: Reading, Math, Attention, Language, 1, 2, 5, 11, 14, 20, 22, 23)
- ➢ Point out differences between the blocks and why some click/fit together, and others do not. (helpful for student challenges related to: Related to challenges in visual processing that are often associated with Reading and Math 16, 20, 22)

**Teacher adjustment recommendations - accommodations:** none

Suggestion 5

**Lesson section:** Student materials – Capturing Clicks As Points, page 3

**Task description:** Students automate the process of getting coordinates by clicking on the desired points on a screen.

**Some students may have difficulty:**
- understanding terms and processes (e.g., automating the coordinates process) presented as dense written text and visuals in varied formats (informational and play dialogue, visual representations of code containing numeric values) (Reading, Math, Attention, Language, 1, 2, 5, 11, 14, 20, 22, 23)
- identifying and using new block commands and variables; understanding the block commands, their features, their names, and how they relate to one another (Related to challenges in visual processing that are often associated with Reading and Math 16, 20, 22)

**Teacher adjustment recommendations - adaptations:**
- ➤ Project page 3 and guide students through the instructions about how to modify the script to automate the process to get coordinates. Discuss content; assist students in comprehending the dialogue among the fictional students, review x, y coordinates and the new terminology, and walk them through the process for creating the abstract data type script. (helpful for student challenges related to: Reading, Math, Attention, Language, 1, 2, 5, 11, 14, 20, 22, 23)
- ➤ Point out differences between the blocks and why some click/fit together, and others do not. (helpful for student challenges related to: Related to challenges in visual processing that are often associated with Reading and Math 16, 20, 22)

**Teacher adjustment recommendations - accommodations:** none