BEST
Buckingham Educational Services & Training, LLC

# Executive Function Skills and AAC Connections

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# Presenter

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Financial Disclosures:

- Owner, Buckingham Educational Services & Training, LLC
- Lead Assistive Technology Facilitator, Kansas Infinitec

Non- Financial Disclosures:

- ASHA member

# Resources Link

BEST
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pbuckingham.com

- Resources
  - Utah Assistive Technology Teams Conference 2025

**Password: Utah**

Links to all slides and resources shared for each session

# OBJECTIVES

Participants will be able to:

- Identify the connection between language development and executive function skills
- Employ purposeful executive function skill teaching when using an AAC system
- Prepare vocabulary to target different executive function skills

**Support student in learning skills for life**

- You will learn something new.
- You will think differently about something you already knew.
- You will re-evaluate how you are doing something and if you are not getting the results you want, you will try a different way.
- You will expand your learning in this area.
- You will make a new friend.

The next time you are in the classroom, you will take 1 item from today and use it with students.

# Who are you?

- Why did you pick this session?
- What do you hope to learn from it?

**https://padlet.com/pbuckinghamkansas/EF_AAC_UATT**

# Why EF skills are Needed for Students with Complex Needs

- Reduce para/adult/caregiver support
- Self confidence
- Increase Independence
  - Living
  - Working
  - Relationships
- Student at age 25
- EF are the skills that allow you to keep a job

# Harvard Study

Executive Functions are the "Air Traffic Control" system of the brain.

Born with potential to develop executive function skills based on experiences.

# Defining Executive Functions

- Conscious Control of what we think and do
- Enables self-regulation of one's own actions and emotions
- Coordinates goal-setting with the planning required to accomplish the goal or task
- Control of Attention and Focus skills
- Ability to think/act in a flexible manner with tolerance for frustration

# Executive Function Things To Know

- The children that benefit most from any EF intervention are the students with the lowest EF skills
- EF demands need to be continually incrementally increased or few gains are seen
- Repeated practice is key
- EFs are trainable and can be improved at any age
- EFs early in life have been found to predict lifelong achievement

*Executive Functions | Annual Review of Psychology*. (2023). Annualreviews.Org. https://www.annualreviews.org/doi/10.1146/annurev-psych-113011-143750

# Life without Schemas Means When you . . .

Are told to clean your room -> you have no method

Are asked get ready for bed-> don’t have a flow chart

Play a game -> are frustrated when you have to wait your turn

Start a new job-> don’t know what to do or where to go

**Experience new unfamiliar situations, you don’t know what to do, how to behave, or where to start.**

# Determining what to work on

Use an EF checklist and determine not only weaknesses but strengths. The weaknesses can be used for IEP goals/ accommodation areas and the strengths are used to build independence in working toward improving the weaknesses.

| Person | Response Inhibition | Working memory | Emotional Control | Sustained Attention | Task Initiation | Planning prioritizing | Organization | Time Management | Goal directed persistence | Flexibility | Metacognition |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mom | 10 | 9 | 8 | 15 | 11 | 14 | 6 | 14 | 7 | 8 | 8 |
| Sped Teacher | 11 | 8 | 5 | 10 | 11 | 9 | 10 | 12 | 10 | 8 | 6 |
| Gen Ed | 11 | 7 | 6 | 11 | 11 | 10 | 9 | 9 | 10 | 8 | 10 |
| Total | 32 | 24 | 19 | 36 | 33 | 33 | 25 | 35 | 27 | 24 | 24 |
| Average | 10.7 | 8.0 | 6.3 | 12.0 | 11.0 | 11.0 | 8.3 | 11.7 | 9.0 | 8.0 | 8.0 |

# Executive Function Checklist Options

- Executive Function Skills Checklist- looks at 4 skills
- EF works library The Executive Skills Profile- free
  - Based on Dawson and Guare information
- ADDitude- Free checklist with your email address
- BiLinguistics- Free Checklist for different levels

# Improving Executive Functioning

# Principles for Improving Executive Skills

- Teach the deficit skill
  - Model what you want the student to do
  - Talk out loud about what you are doing
- Consider the child's developmental level
- Move from external to internal
  - External includes changes you can make in the environment, task, or way you interact with the child.
- Modify tasks to match child's capacity to exert effort
- Use child's desire for control
- Be patient- this can take time
- Use visuals

Northstarpaths.com

# Language

# What we know about language

- We learn language by first “hearing” it or being exposed to it receptively.
- We can not “speak” a language we have never heard or been exposed to.
- The more exposure we have to a language the quicker we are to learn it- immersion
- We fix our errors when others accept our communication attempt, but repeat it back to us with the correct language.

# 11 Skills Toddlers Master Before Words Emerge

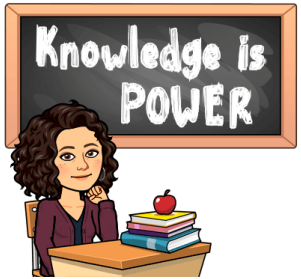
1. Reacts to events in the environment
2. Responds to people when they talk or play with them
3. Takes turns with you during interactions
4. Develops a longer attention span
5. Shifts and shares joint attention with others
6. Plays with a variety of toys appropriately
7. Understands early words and follows simple directions
8. Vocalizes or makes sounds purposefully
9. Imitates actions, gestures, sounds, and words
10. Uses early gestures like waving and pointing
11. Initiates interaction with others to get needs met or to play

- What language do we use in these situations?
- What would this look like for an AAC user?

From Let's Talk About Talking at teachmetotalk.com

# Executive Function Ability is Directly Linked to Language Ability

In order to develop executive function skills and be purposeful in using them, you need the language to go with that skill.




Receptive to understand what is happening in your world

Expressive to share about what is happening and how it impacts you

**Expressive and Receptive language ability may not be at the same developmental level**

| Principles for Improving Executive Function Skills | Best practice in AAC development |
| --- | --- |
| Teach to the deficit skill | System has to be taught<br>Model (aided language) |
| Consider developmental level | Functions of language<br>System selection<br>Core Words |
| Move from external supports to internal | Visual Supports<br>Color Coding<br>Aided Language<br>Pull back on prompts as student learns |
| Modify tasks to match the student's capacity for effort | Core Words<br>GLP<br>System Setup (Motor planning, categories, topic pages) |
| Use student's desire for control | Follow student lead and assign meaning |

# AAC- Augmentative Alternative Communication

Learning a new language takes time. It requires others to speak the language to the learner repeatedly to encourage use of the new language.

- A growth mindset of “not yet” needs to be used.
- Expect output that is “messy”
- Correct “mistakes” the same way you would with a young child learning language
- MODEL the language consistently through all environments
- It takes TIME- sometimes YEARS

# AAC- Augmentative Alternative Communication

- Individuals need 200 opportunities a day to become proficient AAC users.
- You must develop language in natural contexts
- Many AAC users have not had the experience with the power of communication
- Research tells us that routines are the heart of symbol and language development
- One of the most important target skills for students is being able to gain attention in an appropriate way

-Susan Berkowitz, *Make the Connection*

# Vocabulary

# Word learning and order

There is not a developmental order to word learning.

“The order of learning words resides in children’s environments and experiences: what they hear, see, are told, and read.”

-*Choosing Words to Teach*- Beck, McKeown, and Kucan

# What format do you use to teach AAC vocabulary?

Join at

**slido.com**

**#5025 676**

# CORE

Core words are the most frequently used words in communication.

Core words are to be taught and reinforced using natural situations.

| # of Core Words | % of Total Words Communicated |
|---|---|
| 50 | 40-50% |
| 100 | 60% |
| 200 | 70% |
| 400 | 80% |

(Vanderheiden & Kelso, 1987)

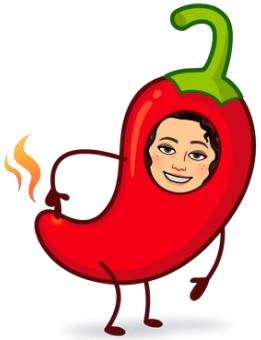
# Examples of Core Words

**Stop Go More Turn Mine On Off Up Down That**

**Using just these 11 words make as many phrases as you can in 1 minute**

# Fringe Words

Extra words that add “spice” to the message. They are specific to the communicator and are not as flexible in how they are used.



Mine pumpkin

Go train

Dinosaur

# Tiered Vocabulary

- Tier 1- most basic words
  - These are words that appear in oral conversation
- Tier 2- High utility for mature language users
  - Found across different domains (conversation and print)
- Tier 3- Frequency of use is low
  - Used when a specific need arises and usually found in literature



Beck, McKeown, Kucan (2013) Bringing Words to Life

All Core Words are Tier 1 words

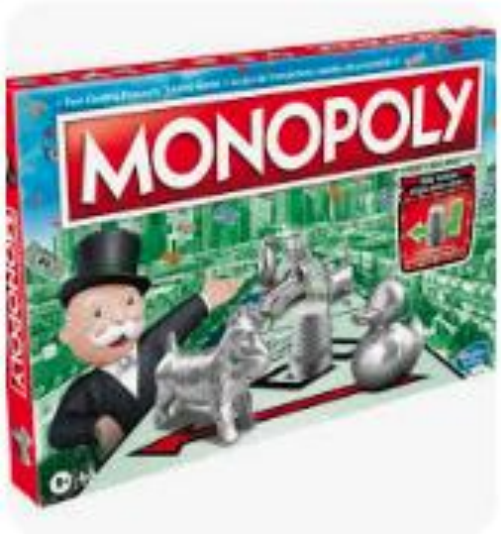
Not all Tier 1 words are Core Words

# Playing a Game with Tiered words

**Tier 1 words we would use playing Monopoly**

**Tier 2 words we would use playing Monopoly**

**Tier 3 words playing Monopoly**



# Communication Matrix Overview

Communicationmatrix.org

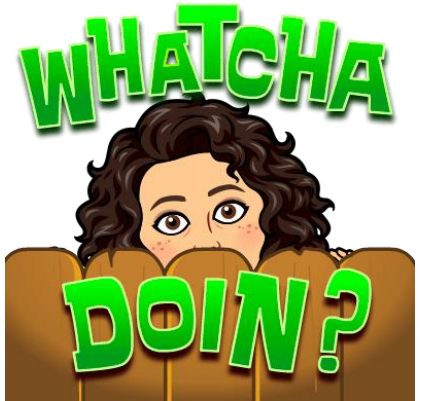
- Free for 2 assessments
  - Can be done online or paper copy that you then enter online
- Can purchase additional assessment credits
- Can purchase custom reports
  - Sample Report
- Scientific foundation with hands on clinical research
  - Inspired by work of Elizabeth Bates and her colleagues
  - Heinz Werner and Bernard Kaplan

# Matrix Structure

4 major reasons to communicate

- **Refuse** things we don't want
- **Obtain** things that we do want
- **Engage** in social interaction
- **Provide** or seek information



Under each of these four major reasons are 24 more specific messages that people express. Each of these messages correspond to the 24 questions you answer as you complete the Matrix. The specific messages are arranged by Level and Reason.

<table>
<tr><th>LEVEL</th><th>REFUSE</th><th>OBTAIN</th><th>SOCIAL</th><th>INFORMATION</th></tr>
<tr><td>I</td><td>-Expresses Discomfort</td><td>-Expresses Comfort</td><td>-Expresses Interest in Other People</td><td></td></tr>
<tr><td>II</td><td>-Protests</td><td>-Continues an Action<br>-Obtains More of Something</td><td>-Attracts Attention</td><td></td></tr>
<tr><td>III</td><td rowspan="5">-Refuses or Rejects Something</td><td rowspan="2">-Requests More of an Action<br>-Requests a New Action<br>-Requests More of an Object<br>-Makes Choices<br>-Requests a New Object</td><td>-Requests Attention<br>-Shows Affection</td><td></td></tr>
<tr><td>IV</td><td rowspan="3">-Greets People<br>-Offers Things or Shares<br>-Direct Your Attention to Something<br>-Uses Polite Social Forms</td><td>-Answers "Yes" and "No" Questions<br>-Asks Questions</td></tr>
<tr><td>V</td><td rowspan="3">-Requests Objects that are Absent</td><td rowspan="3">-Names Things or People<br>-Makes Comments</td></tr>
<tr><td>VI</td></tr>
<tr><td>VII</td></tr>
</table>

# How to score the child's communication

**MASTERED**

– *Does this independently most of the time when the opportunity arises*

– *Does this in a number of di erent contexts, and with di erent people*

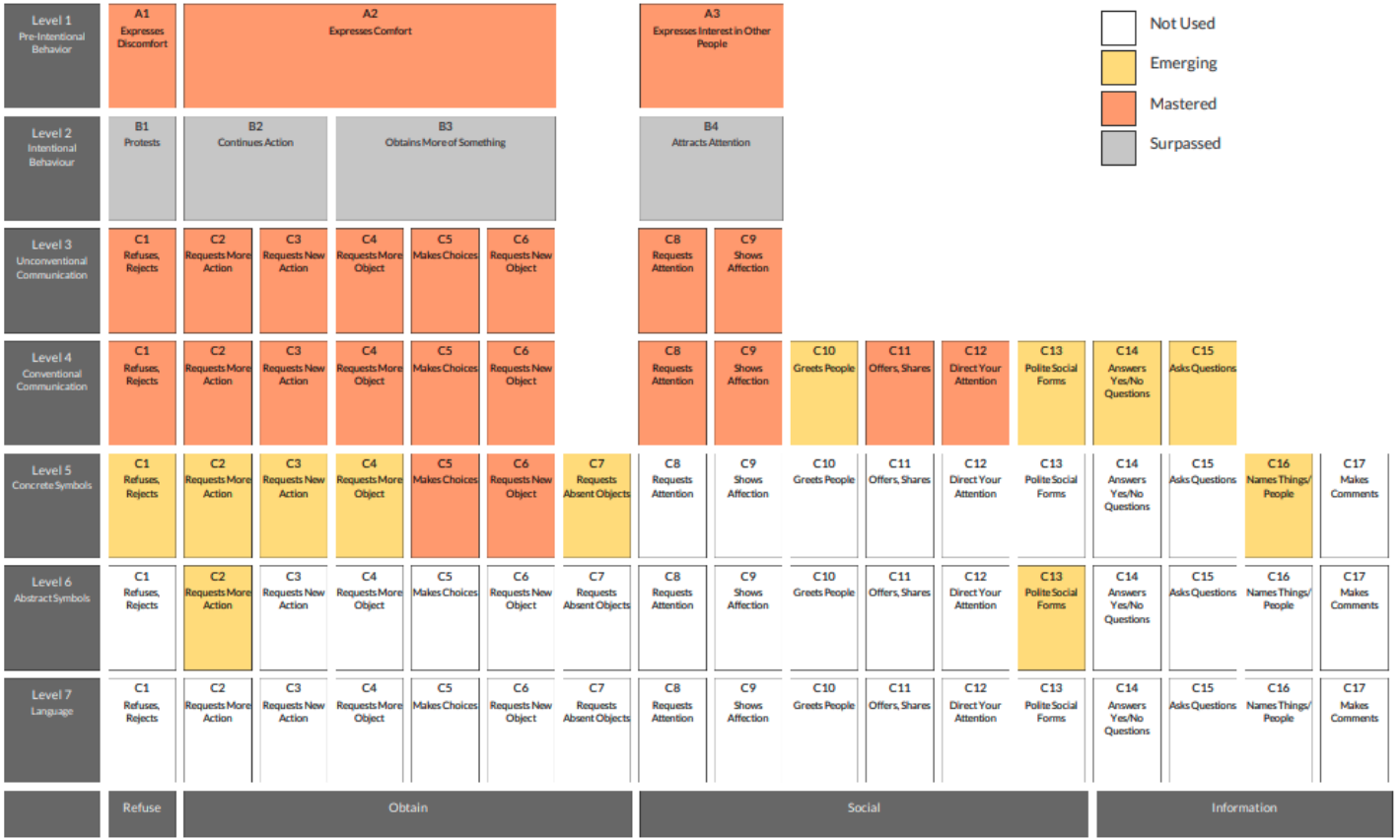
**EMERGING**

– *Does this inconsistently*

– *Only does this when prompted or encouraged to do so. Only does this in one or two contexts or with one person.*

communicationmatrix.org

AAC and EF (381288)
MATRIX ID: **613160** ADMIN DATE: **3/13/2023**



Add to notes what skills the student is missing and which are emerging.

Notice if these missing skills correlate to lower EF skills scores

## Executive Function and AAC

Student age (year: month) _____

Communication Matrix:

| Level | Majority of Skills (circle)<br>If 50% circle both areas | Notes |
|---|---|---|
| | Surpassed Mastered Emerging Not Used | |
| | Surpassed Mastered Emerging Not Used | |
| | Surpassed Mastered Emerging Not Used | |
| | Surpassed Mastered Emerging Not Used | |
| | Surpassed Mastered Emerging Not Used | |
| | Surpassed Mastered Emerging Not Used | |
| | Surpassed Mastered Emerging Not Used | |

Executive Function Checklist Scores:

Response Inhibition _____

Working Memory _____

Emotional Control _____

Sustained Attention _____

Note anything exceptional you noticed when doing the Communication Matrix or the EF Checklist:

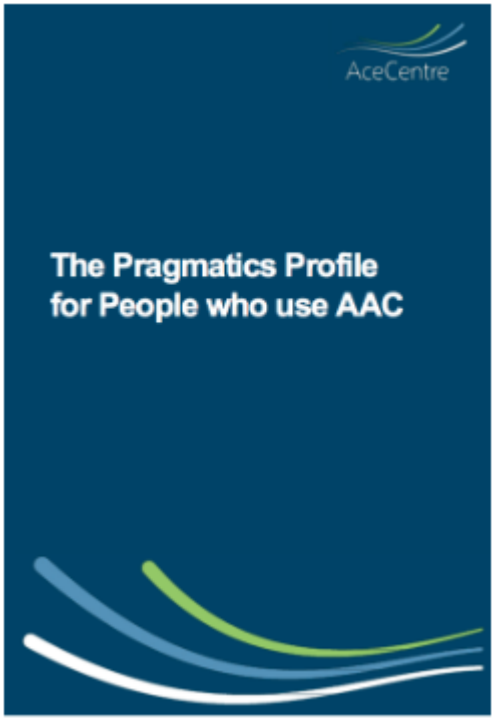
# Communication Matrix Levels

| 1 Pre-Intentional Behavior | 2 Intentional Behavior | 3 Unconventional Behavior | 4 Conventional Communication | 5 Concrete Symbols | 6 Abstract Symbols | 7 Language |
|---|---|---|---|---|---|---|
| 0-3 months | 3-8 months | 6-12 months | 12-18 months | 12-24 months | 12-24 months | 24+ months |
| Behavior is not under the individual's own control, but it reflects his general state<br><br>Caregivers interpret the individual's state from behaviors such as body movements, facial expressions and sounds. | Behavior is under the individual's control, but it is not yet used to communicate intentionally. Caregivers interpret the individual's needs and desires from behaviors such as body movements, facial expressions, vocalizations and eye gaze. | Used intentionally to communicate. Do not involve any sort of symbol; and they are not socially acceptable for us to use as we grow older.<br><br>Communicative behaviors include body movements, vocalizations, facial expressions and simple gestures (such as tugging on people). | Used intentionally to communicate. Do not involve any sort of symbol; socially acceptable and we continue to use them to accompany our language<br><br>Include pointing, nodding or shaking the head, waving, hugging, and looking from a person to a desired object. Vocalizations may be used. | Concrete symbols look like, feel like, move like, or sound like what they represent. Concrete symbols include pictures, objects and sounds<br>Most individuals skip this stage and go directly to Level VI. | Speech, manual signs, printed words are used to communicate. These symbols are "abstract" because they are NOT physically similar to what they represent. At this level they are used one at a time. | Symbols (concrete or abstract) are combined into two- or three-symbol combinations ("want juice", "me go out"), according to grammatical rules. The individual understands that the meaning of symbol combinations may differ depending upon how the symbols are ordered. |

# The Pragmatics Profile for People who use AAC

Free download from ACECentre

https://acecentre.org.uk/resources/pragmatics-profile-people-use-aac



# Developmentally 0-24 months- Infant

Communication Matrix Level 1-5/6 (concrete/abstract symbol level)

- **Planning**
  - Pointing and grabbing
  - Acting on environment
- **Organization**
  - Begin Matching skills
  - Colors, shapes, early categories
  - Overgeneralize categories (all 4 legged animals are dogs)
- **Working Memory**
  - Simple Recall Games (peek-a–boo)
  - Participates and enjoys simple familiar rhymes and songs
  - Begins to fill in the blank when pausing in familiar songs

# Developmentally age 2-4 years- Toddler

Communication Matrix Level 5/6/7 (Concrete symbol/ Abstract Symbol/ Language)

- **Planning**
  - Simple instructions
- **Time Management**
  - Time concepts
  - Follows Visual Schedule
  - Waiting- emerging
- **Task Initiation**
  - Start and complete tasks up to 10 minutes
- **Organization**
  - Categories, patterns
  - Cleans up with assistance

- **Working Memory**
  - Follows along with songs/finger play with multiple steps
  - Sings familiar songs/ rhymes

- **Emotional Control**
  - Able to label own emotions
  - Able to label emotions of others
  - Has tantrums when upset, frustrated, overwhelmed and requires support to overcome

# Developmentally 5-12 years- Early Learner

## Communication Matrix- Level 7 (language)

- **Planning**
  - Follow steps to meet an end goal
  - Plays games requiring strategy
- **Time Management**
  - Developing sense of time and ability to estimate time- how long things will take
  - Manage leisure time
- **Task initiation**
  - Independently start and complete task 30-60 minutes

- **Organization**
  - Organize and Sequence stories
  - Follow simple checklist
  - Gathers materials for familiar routine (may be with reminders)
- **Working Memory**
  - Independent with puzzles or games
  - Collect information and apply it to new setting
- **Emotional Control**
  - Learns to self soothe to control tantrums and emotional dysregulation

- Consider the student's communication level and which EF skills are strongest and weakest
- What would you target and why?

## Executive Function and AAC

Student age (year: month) _____

Communication Matrix:

| Level | Majority of Skills (circle)<br>If 50% circle both areas | Notes |
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| | Surpassed Mastered Emerging Not Used | |
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Executive Function Checklist Scores:

Response Inhibition _____

Working Memory _____

Emotional Control _____

Sustained Attention _____

Note anything exceptional you noticed when doing the Communication Matrix or the EF Checklist:

# BEES for Communication and Activity Planning

# BEES for Communication

**B**ehavior- What behavior is getting in the way of the student being more independent?

**E**xecutive Function- What executive function is connected to the Behavior?

**E**nvironment- What supports are in the environment now that an support the executive function?

**S**trategy- What strategy can you put in place to teach/ model the executive function skill and impact the behavior? For AAC- What words will you focus on (Core/Fringe)?

# BEES getting started

- Think of a student
- Write down one behavior negatively impacts the student in the classroom
  - If there are multiple tasks then pick the one that would make the largest impact on their independence or the one that is getting in the way of learning the most
- Write down ideas of supports as they are shared or as they pop into your head- we will use these later

# Make a BEES Plan for AAC

1. Think of a student you have that uses AAC
2. What behavior is getting in the way of that student becoming more independent?
3. What Executive Function do you think that connects to?
4. What environmental supports are already in place to teach that EF?
5. What vocabulary words do you want to focus on to increase this Executive Function Skill?
6. How will you share this with staff?

**B**ehavior that you want to change:

**E**xecutive function that impacts the task:

What is in the **E**nvironment already that supports the change you want to see?

| **S**trategy/Vocabulary | What do you need to do this? | Who do you need to bring on board? | How will you monitor progress? | Possible indicator of not working |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# Executive Function Skills

# Executive Skills

- Response Inhibition
- Working memory
- Emotional Control
- Sustained Attention
- Task Initiation
- Planning/ Prioritizing
- Organization
- Time Management
- Goal-directed Persistence
- Flexibility
- Metacognition

Smart but Scattered- Dawson and Guare (2009)

# Response Inhibition

Grand daddy of all skills- allows all other executive skills to develop. More difficult when you are emotionally charged

- Can share toys or materials
- Can wait for a short period of time
- Keeps hands and feet to self
- Can follow simple 1-2 step directions
- Follows simple classroom rules
- Able to calm self when upset

# Response Inhibition Impact

Granddaddy of Executive Function Skills

Student rushes through work
Gives up on independent work when obstacles are encountered
Finds other things to do that are more "fun"
Blurts out inappropriate responses
Can't wait for their turn playing a game
Doesn't consider consequences before acting

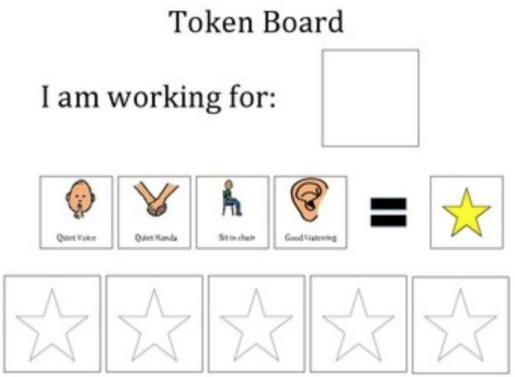
Myth- "Student is out of control" " Student is class clown" "Student is rude"

# Teaching Response Inhibition

- Delayed gratification using planned waiting periods
- Earn things they want
- There are consequences for poor impulse control
- Plan ahead and prepare for situation
  - Social stories, discussion about what to do
- Role playing
- Cue before entering the situation

# Response Inhibition Environmental Supports

- Wait symbol
- Stop symbol
- Visual barriers in classroom
- Schedule that is time related
- Visual Schedule
- Token Board
- First- Then
- Time Timer




# Response Inhibition Padlet

What words would you focus on to support the development of Response Inhibition?

Response Inhibition

# Working Memory

The ability to hold information in memory while performing complex tasks. Uses the ability to pull from past experiences and apply what they know.

- Develops early in infancy
  - Hide toy and child looks for it
- As language develops the working memory expands
- Follow Directions
- Follows Schedule
- Able to keep track of materials

Dawson, Peg and Richard Guare- *Smart but Scattered (2009)*

Information not rehearsed leads to DECAY of that information.

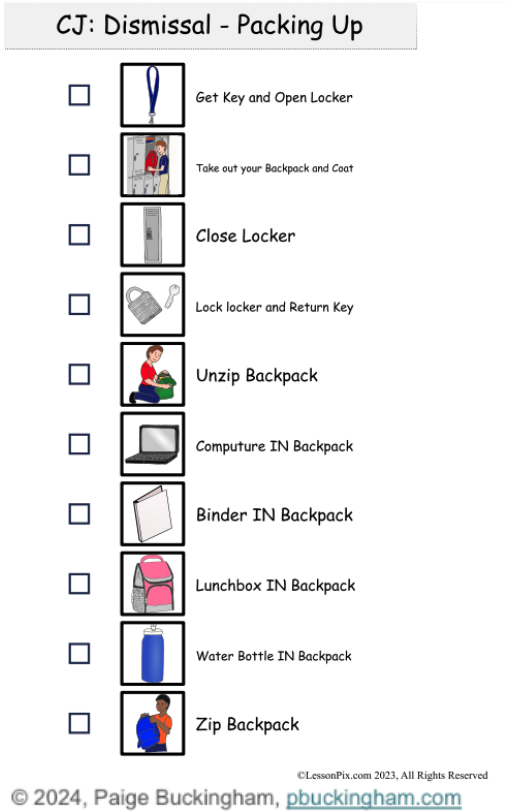
(Feifer, 2016)

# Working Out your Working Memory

What does this look like with respect to AAC?

- Mnemonics
- Chunking
- Know you you learn best
  - Visual
  - Auditory
  - Kinesthetic
  - Combo
- Routines
- Teach someone else

# Environmental Supports for Working Memory







- Visual Schedule
- Social Stories
- Task Boxes
- First Then
- Visual Supports
  - Head to Toe Ready to Go
  - Block in Box (from Sarah Ward)
- Task Analysis of Activities
  - Step-by-step visuals or checklists

# Padlet

What are some worlds that would support Working Memory?

Working Memory

# Emotional Control

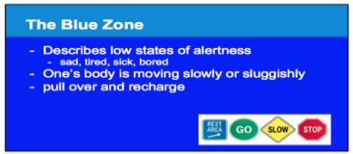
The ability to manage emotions to achieve goals, complete tasks or control and direct behavior.

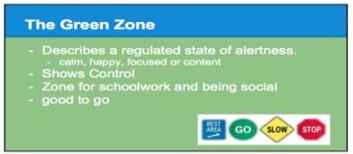
Not just anger, but anxiety, frustration and disappointment

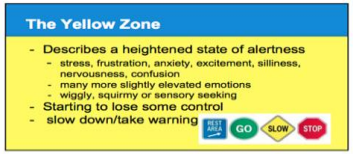

Dawson, Peg and Richard Guare- *Smart but Scattered (2009)*

# Emotional Control Environmental Supports

- Zones of regulation
- Incredible 5 Point Scale
- First-Then
- Size of the Problem
- Visual Schedule
- TIme Timer
- Social Thinking Materials
  - Superflex
- Everyday Speech Materials

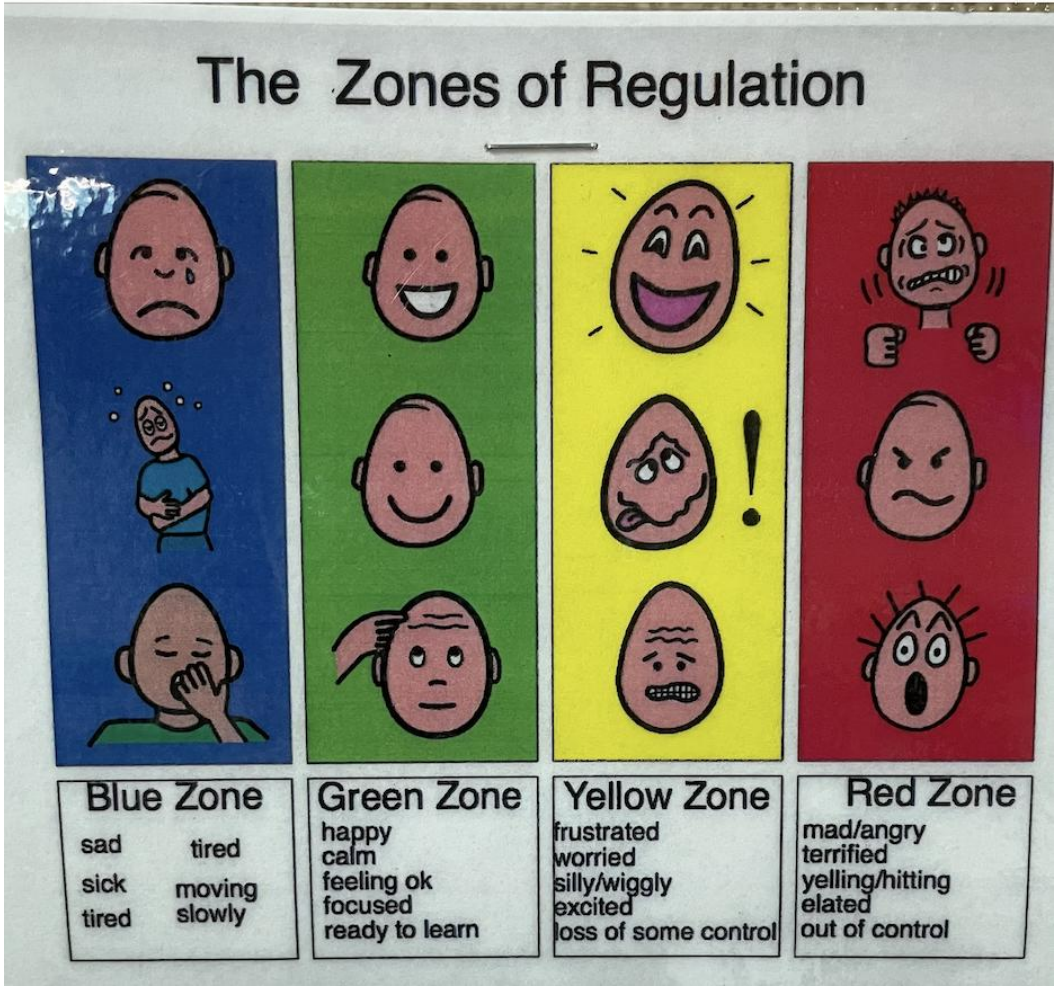




Music has been found to have an impact on improving all executive function skills especially Inhibitory Control.

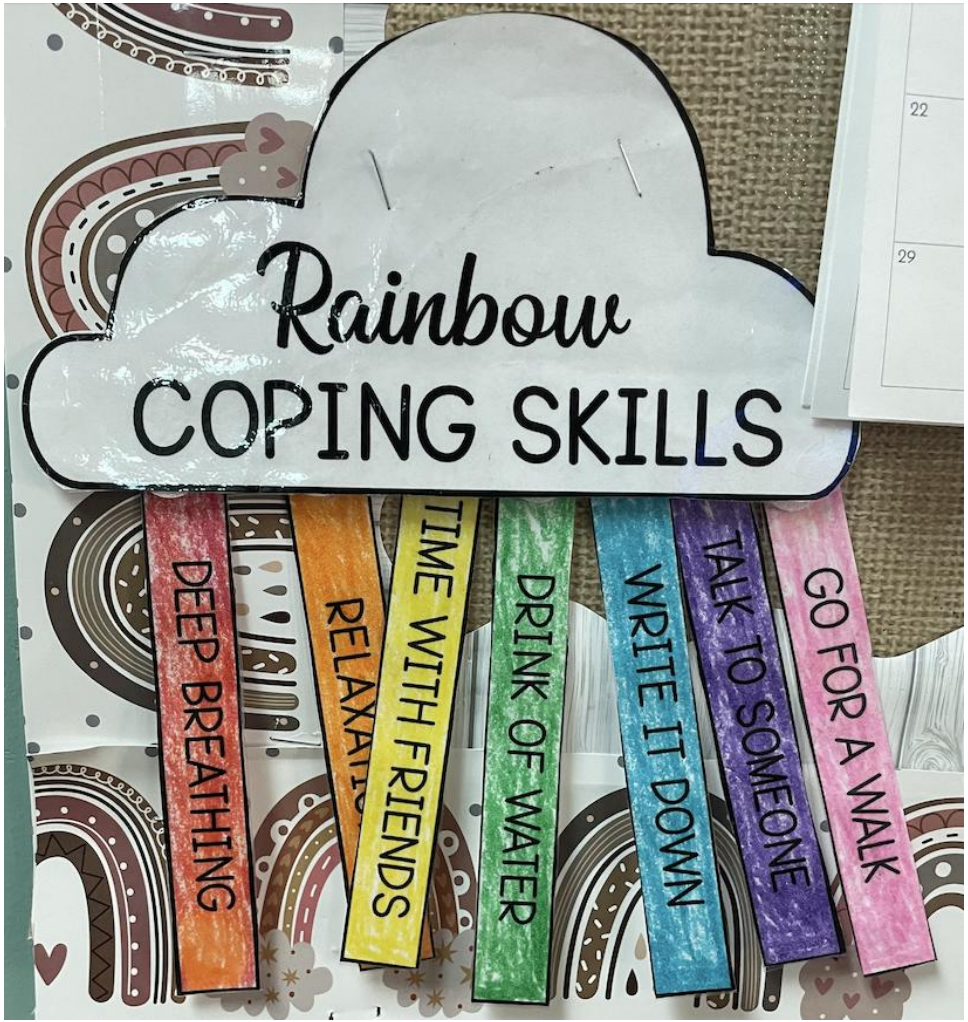
Requires focus, concentration, and self-discipline.

- Rhythm activities specifically drumming can increase attention, and working memory while also reducing anxiety and depression.
- Call and response activities help with short term memory and cognitive flexibility
- Even listening to music can help with executive function skills while doing work. Keep it less distracting.




From the classroom of Alex Smith, Lawrence, KS

From the classroom of Alex Smith, Lawrence, KS




LessonPix now has blank face symbols

Use these to have students draw their feeling on the face.

# Emotional Control by age

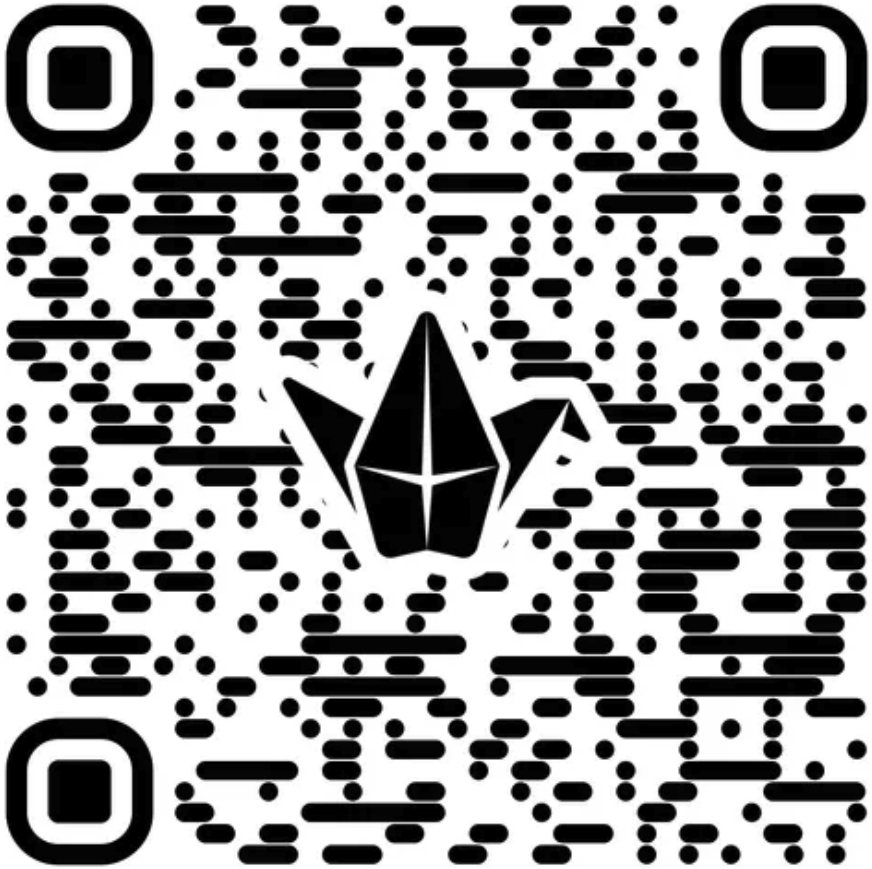
- **Baby**- needs typically are met immediately. When they are not, kids learn to self soothe
- **Toddler-age 3**- Kids develop rituals and routines. Some can roll with things and some can not. Overlap in emotional control and flexibility
- **Elementary**- Weak emotional control typically shows up in social problems. Strong EC allows child to make compromises and are the peacemakers
- **Adolescence**- In general more susceptible to breakdown and ability to handle stress. Brain overload leads to either slow or fast bad decisions. Minimize stress

# Emotional Control Padlet

What are words that would support Emotional Control?

Emotional Control

https://padlet.com/pbuckinghamkansas/uatt



# Embed EF Skills Throughout the Day

| Time | Activity | Target EF Skill | Targeted Vocabulary to model | Communication supports/system needed | Communication Partners | Communicati on Partner Expectations | Student Expectations in this Acivity | Data Collection |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

Adapted from the Comprehensive Autism Planning System (CAPS) Authors: Shawn A. Henry and Brenda Smith Myles, PhD and the TASN Communication Support Tool

# https://padlet.com/pbuckinghamkansas/today

- What is one thing you learned that you did not know?
- What is something that you plan to implement from today?
- What additional questions do you have?
  - Who can you go to for help with

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