Application of Systematic Instruction for training AAC in adults

Aimee R. Mooney, M.S. CCC-SLP/L
USSAAC
September 25, 2018

Seminar Objectives

1. Describe the six essential principles of Systematic Instruction

2. Identify three characteristics that support intervention success

3. Discuss stages of learning and how to optimize intervention in AAC

4. Describe methods to enhance effectiveness of AAC with adults complex communication needs.

5 minutes	**Introduction of Speaker, USSAAC and topic**
5 minutes	Setting the stage: same page AAC Thinking about thinking
5 minutes	Variables that support intervention success
15 minutes	Systematic Instruction
5 minutes	Stages of Learning
10 minutes	Case Example
5 Minutes	Q & A

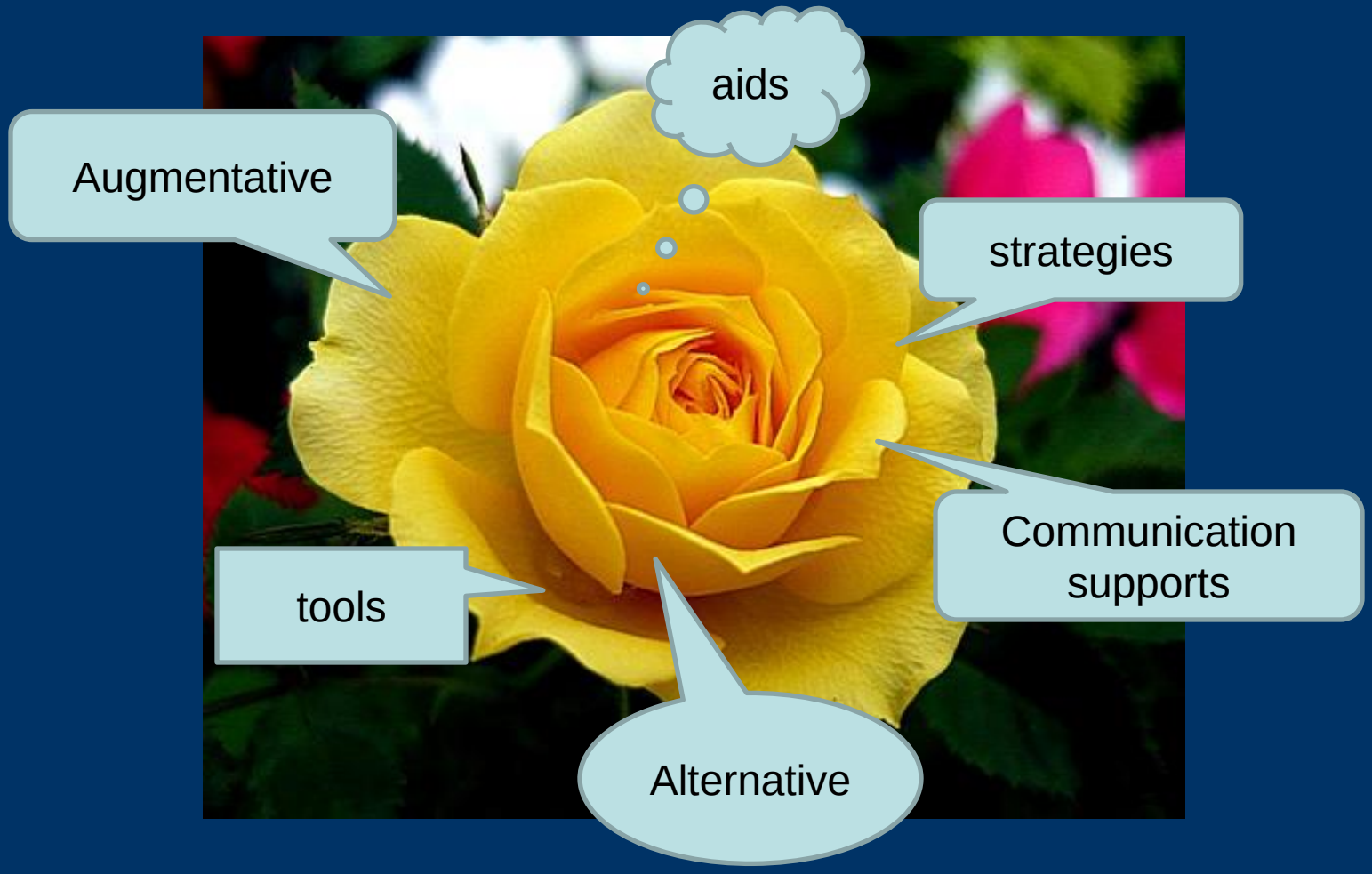
Take-Aways

- Communication supports without TRAINING is not supportive!

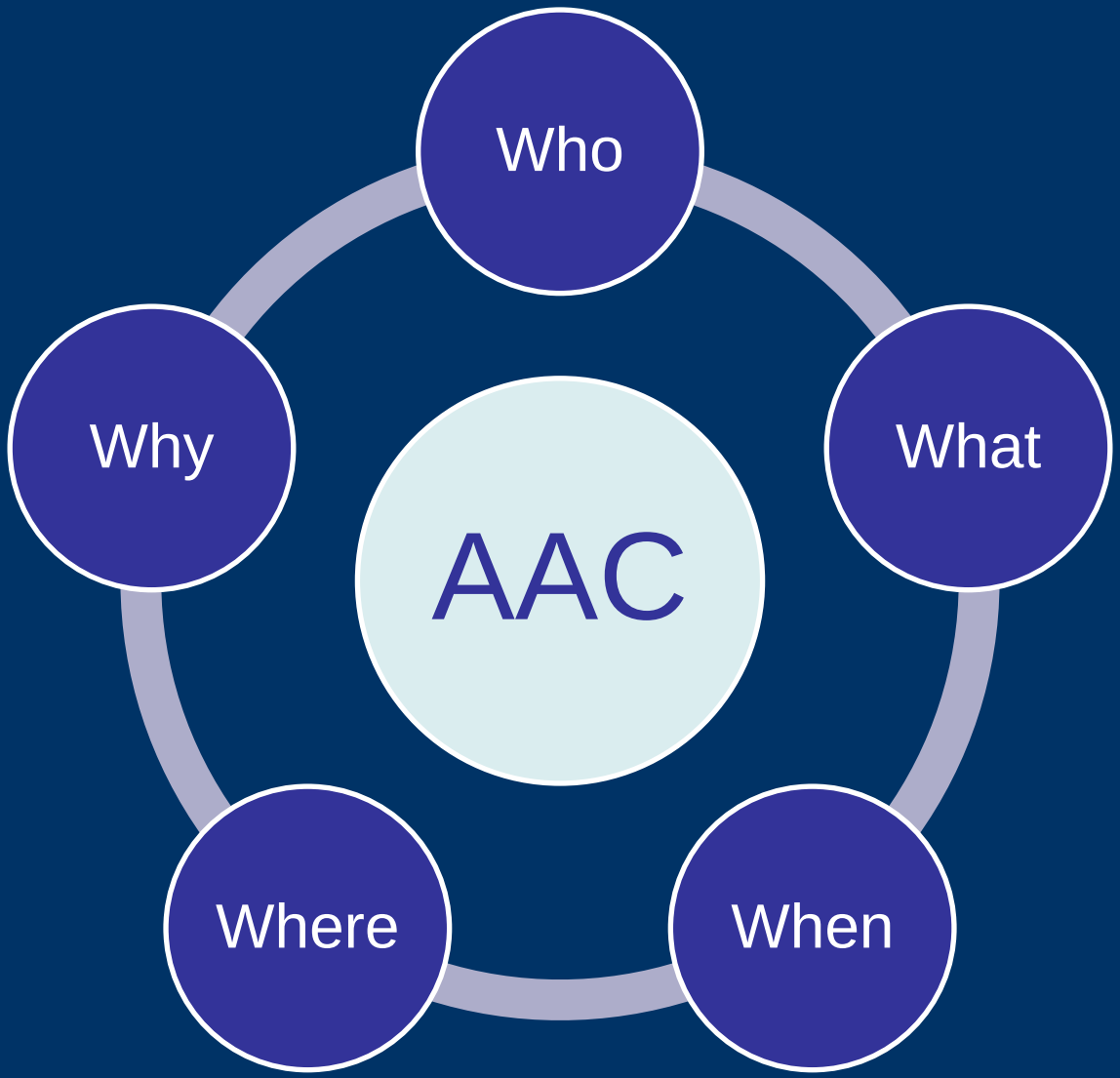
- Systematic Instruction is effective.
- Systematic Instruction takes time, plan for it.
- Train to MASTERY.
- Plan for, and practice activities to promote generalization.

SETTING THE STAGE: AAC

What's in a name? “AAC”



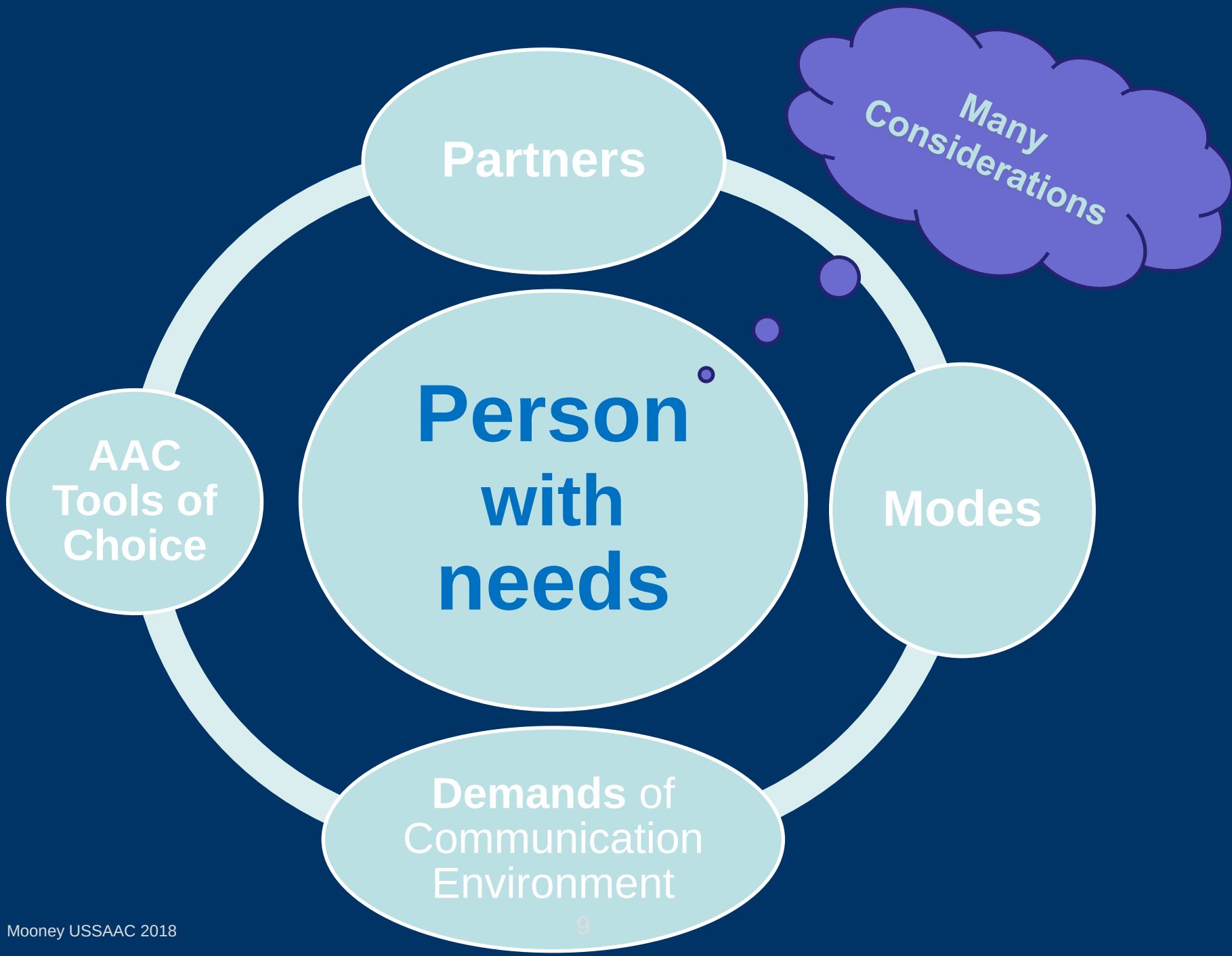
5 w's of AAC



WHO:

- Adults who rely on AAC
- Communication partners
- Communication facilitators
- AAC clinicians
  - Finders/referrers
  - SLP's in integrated practice
  - AAC Specialists

AAC Services for Adults with Chronic Medical Conditions: Beukelman, Garrett, Yorkston, 2007


Many Considerations
Partners
AAC Tools of Choice
Person with needs
Modes
Demands of Communication Environment

Who: considerations

- ✓ Cognitive skills
  - ✓ “She can’t seem to find the correct page.”
- ✓ Vision and hearing abilities; fine motor skills
- ✓ Previous experience with technology
- ✓ Partner’s experience with technology
- ✓ Motivation
  - ✓ “I bought this for mom to use.”

Partners & modes: considerations

Partners

- Familiar vs. unfamiliar
- Primary?
- Most skilled?
- Willing to learn new com… …ls?
- Willing to teach oth… …municate with individual?

Think about INSTRUCTION

Modes

- Telephone
- Face to face, spontaneous
- Written
- Electronic (text; email)

WHAT: communication supports

Unaided Approaches (Natural modes)

- Speech
- Vocalization
- Gestures
- Eye gaze
- Body language
- Sign language
- Partner co-construction

Aided Approaches (Low tech and high tech tools)

- Pap[illegible] and pencil
- [illegible]nication books
- [illegible]ds and cards
- Speech generating devices
- Mobile technologies and apps

Think about INSTRUCTION

flexible

multi-modal

WHERE


ICU
work
home
Think about INSTRUCTION
Community
Volunteer

WHERE: Considerations

Settings

- 1:1 or group
- Employment/volunteer
- Home/community

Think about INSTRUCTION

Topics

- Familiar vs. unfamiliar

WHEN

- Temporary
- Gradually improving
- Degenerative

WHY

1. Ultimate treatment goal = enhance participation in communicative life.

2. Communication is a collaborative enterprise. Those with communication challenges and partners must develop strategies and resources to send and receive messages successfully.

3. Communication support is an ethical issue. It is the responsibility of the interventionist to identify and establish any method, strategy or resource to help a patient communicate more successfully.

THINKING ABOUT THINKING

COGNITIVE (thinking) SKILLS

Executive Function

New Learning

Memory

Visual Spatial Skills

Attention / Concentration

Speed of Processing

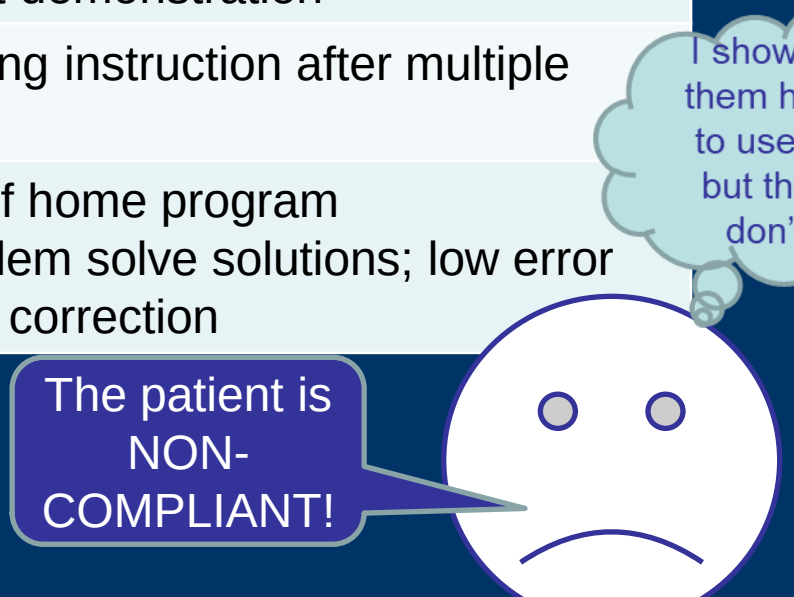
Energy

Factors which make cognition/ communication skills worse:

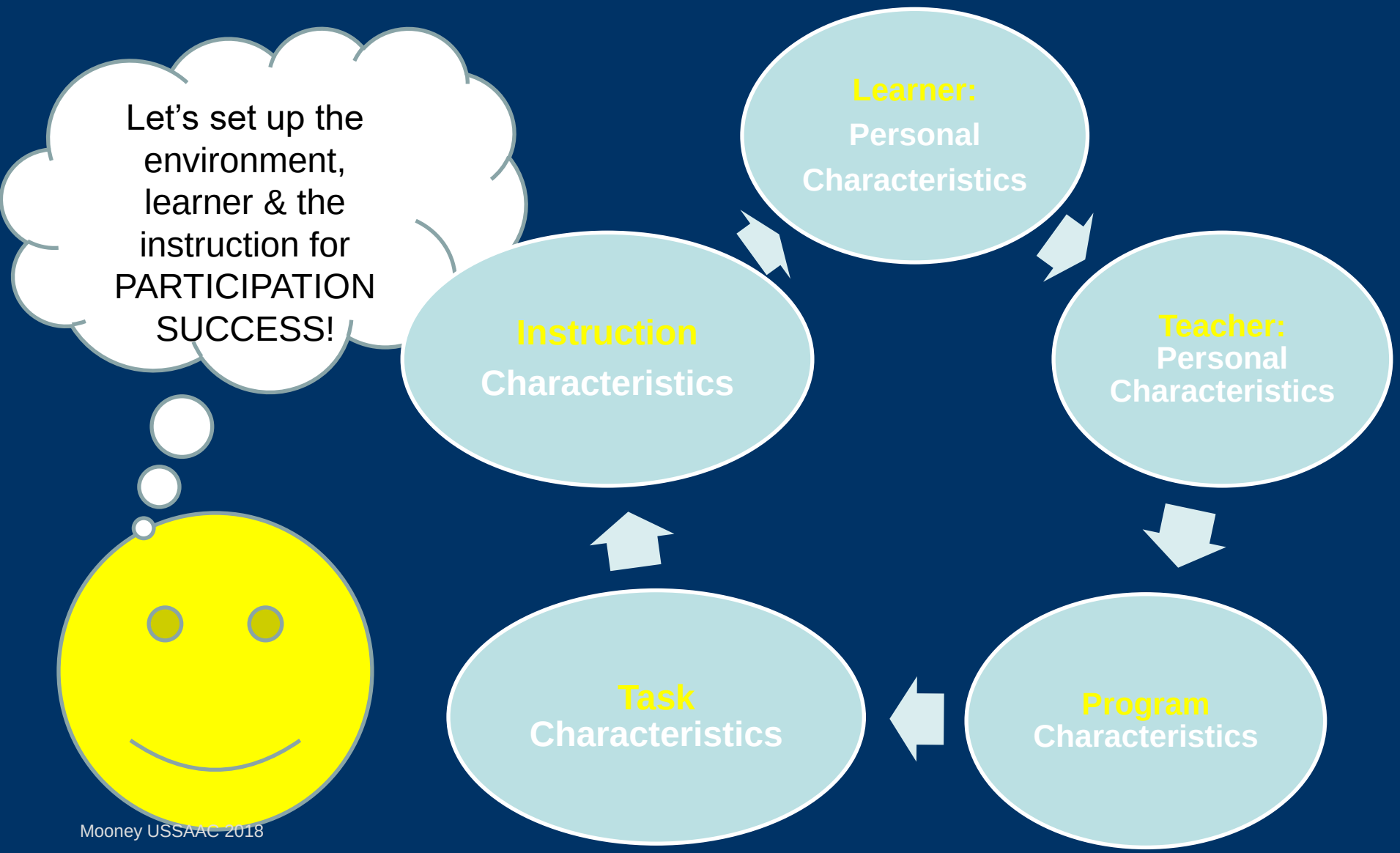
- Fatigue, poor sleep
- Illness
- Medications
- Mood: anxiety, depression
- Stress
- Distraction
- Pain

How does cognitive status impact instruction and AAC use?

Cognitive Area	How Client may present
Speed of Information Processing	May not seem to track instructions. Nods head and says “uh huh, uh huh” but never asks questions or stops for clarification
Attention (Sustained, Selective, Alternating and Divided)	Easily distracted. Loses place during instructions. Difficulty switching gears
Memory	Poor follow through Incorrect repeat demonstration
New Learning	Difficulty following instruction after multiple repetitions
Executive Function	Poor initiation of home program Inability to problem solve solutions; low error awareness and correction



Consider all elements of learning & instruction



VARIABLES THAT SUPPORT INTERVENTION SUCCESS

Personal Characteristics

- **Self-Efficacy**: the belief that you can do a certain task, related to self-confidence.
- **Locus of Control:** internal vs external
- **Beliefs/expectations about Tx**: (consider acute vs chronic)

- **Disease Characteristics:** (consider injury vs degenerative)
- **Cognitive Status**
- **Psychosocial Status** (consider disinterest, apathy, depression, grief, stress or anxiety)

Program Characteristics

- Program Intensity (consider repetition, intensity and neuroplasticity)
- Timing of Intervention
- Task Complexity
- Practice Regime: errors, practice distribution, stimulus variability
- Cueing & Feedback: level of supports, timing & modality of cues
- Maintenance and Generalization
- Therapeutic Relationship

Models of Instruction

- Apprentice Model
  - Ex: technical trade
- “Trial-and-Error” Approach
  - Ex: learning a new sport
- Systematic Instruction
  - Ex: rehabilitation!

Considering COGNITION in training AAC

SYSTEMATIC INSTRUCTION (SI)

Systematic Instruction

- *"Evidence-based, comprehensive package of explicit instructional techniques used to teach strategies to mastery… across populations, including those with cognitive impairment."*
  (Ehlhardt et al 2011,; Sohlberg & Turkstra 2011)

- Based on fields of special education and neuropsychology
- Assumptions
  - Teaching is complex
  - Teaching enables learners to do something
  - A learner's "behavior" can be changed

Systematic Instruction

- Instruction is central to a variety of cognitive intervention approaches, including compensatory and restorative techniques.

- Clinicians are charged with teaching concepts, skills, and procedures to people with compromised cognition

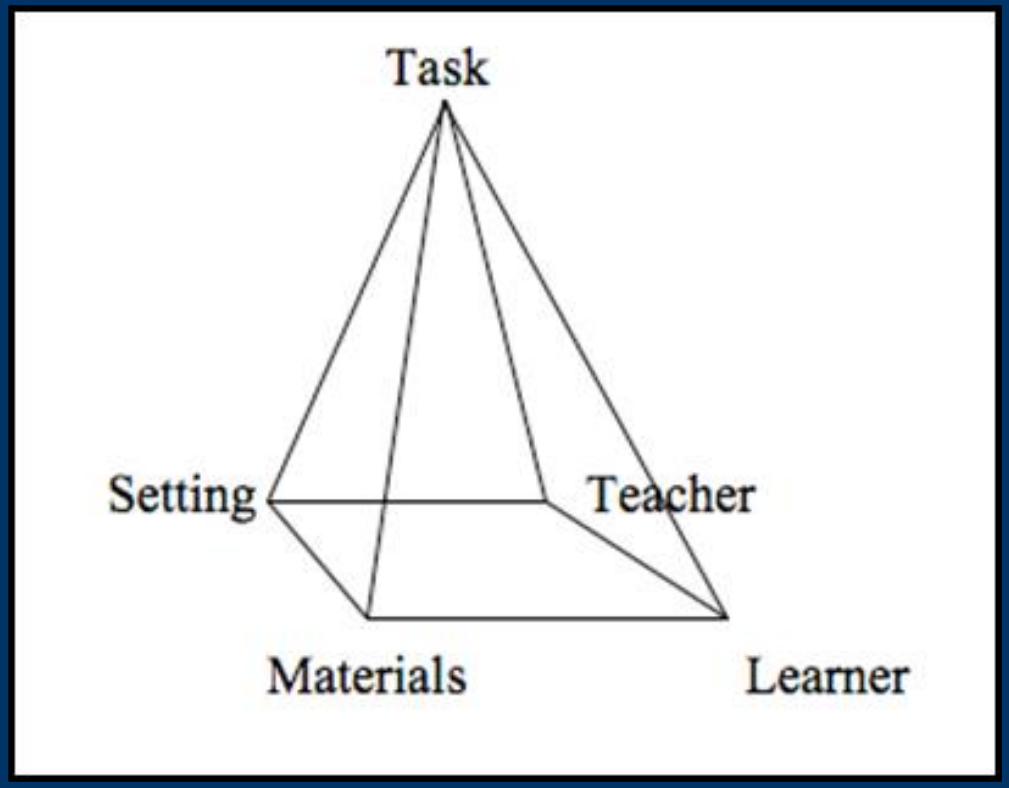
- Training rehabilitation therapists to use specific instructional techniques is associated with improved outcomes for patients

- In this era of reduced funding for rehabilitation, well-designed and delivered instruction =

  key to achieving enduring positive outcomes, maximizing limited treatment resources available

- What is it about *this learner* that makes him/her able to learn?

- What is it about *this instruction* that makes him/her able to learn?



Sound familiar?

Key Components of Assistive Technology for Cognition (ATC) Assessment :

1. Cognitive Assessment

2. Needs Assessment

3. System Selection

4. Trial Use

Scherer, 2011; Sohlberg & Turkstra, 2011

Systematic Instruction

Principles

- Neuroplasticity
- Errorless Learning
- Distributed Practice
- Active Retrieval of Memories
- Meta-Cognitive Engagement

Stages of Learning

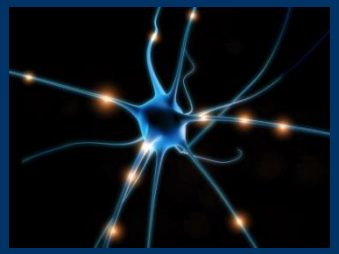
- Acquisition
- Mastery
- Maintenance
- Generalization

Neuroplasticity

SI uses repeated, guided, practice to stimulate neural pathway connections so that learning becomes automatic/effortless/over-learned.

"Neurons that fire together wire together" (Goodwyn-Craine, 2010)

"We are trainers of cells" (Rosenbek, 2009)



Neuroplasticity

- Repetition: high amounts of practice of newly learned skills
- Salience: using meaningful engaging stimuli for practice trials
- Hyper-specificity of practice affects generalization

(Kleim & Jones, 2008)

Errorless Learning

Non-declarative (procedural) memory is a relatively spared/strength for many people with cognitive impairments

- Capitalizes on this strength
- Impaired declarative memory makes it difficult to remember and correct errors
- *Errors stick*!
  - “Trial-and-error” learning is therefore risky!

<u>GOAL of Errorless Learning</u>:

Avoid errors during initial skill acquisition

Errorless Learning

- Enhanced by (Sohlberg, Ehlhardt, & Kennedy, 2005):
  - Sufficient modeling
  - Gradual fading of cues/supports
  - Immediate corrective feedback and remodeling
  - Minimize guessing but encourage effortful processing
  - High amounts of correct practice

Distributed Practice

- Compare to “massed trials” (massed practice, cramming…)

- Spacing out practice trials & encouraging active retrieval encourages long-term learning (Maas et al., 2008)

Distributed Practice: Spaced Retrieval

Build on successful recalls by increasing delay interval

- 30 sec
- 1 min
- 2 min
- 4 min
- 8 min

Brush & Camp (1998)

Spaced Retrieval: Support

Spaced retrieval training has become a leading intervention to assist individuals with memory loss in improving cognitive-linguistic function.

The American Speech-Language-Hearing Association (ASHA) has recognized SRT as evidence-based practice for people with mild to severe cognitive-communicative impairments (ASHA, 2012).

Although SRT methodologies are variable, research has found that SRT can help make improvements in the acquisition, retention, and generalization of trained information and/or skills. Retention of these improvements can occur up to several months following the completion of training (Hopper et al., 2005; Hopper et al., 2013).

Oren, S., Willerton, C., & Small, J. (2014). Effects of Spaced Retrieval Training on Semantic Memory in Alzheimer's Disease: A Systematic Review. *Journal of Speech, Language, and Hearing Research*, *57*(1), 247-270.

Benigas, J. E. (2015). Spaced Retrieval Training: 26 Years of Growth. Perspect Gerontol, 20(1), 34-43. doi: 10.1044/gero20.1.34.

Active Retrieval

- Process of *actively* retrieving memories = strengthens memory associations

Meta-Cognitive Engagement

Keeping learner actively engaged (not passive) in the learning process

- Predict/reflect
- Use client's own keywords/phrases & associations
- Discuss how remembering the target can be helpful/personally relevent…

Systematic Instruction

Principles

- Neuroplasticity
- Errorless Learning
- Distributed Practice
- Active Retrieval of Memories
- Meta-Cognitive Engagement

Stages of Learning

- Acquisition
- Mastery
- Maintenance
- Generalization

STAGES OF LEARNING

Stages of Learning: Goals

Initial Acquisition → *Mastery*

- Initial phase of learning or relearning information or skills

Maintenance

- Extending learning to new contexts and tasks

Generalization

- Retention of information, skills or strategies over time

Stages of Learning

Initial Acquisition → *Mastery*

- Requires sufficient (correct) & variable practice
- Gradually fade prompts/supports as learner improves
- Train to mastery levels (90% over 3 sessions)

Maintenance

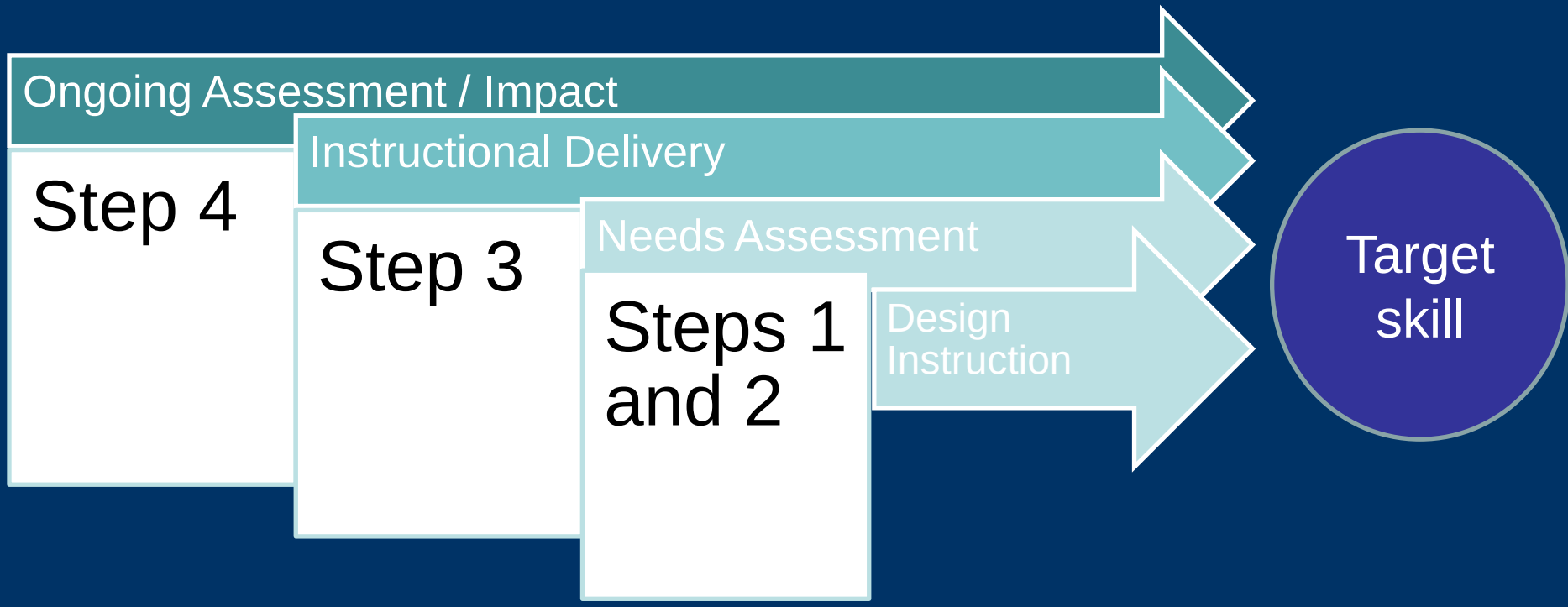
- Distribute practice over time to strengthen neural connections
- Engage in effortful recall & practice (self-reflection/evaluation)

Generalization

- Program for generalization across contexts with multiple exemplars

Systematic Instruction: 4 Steps

- Steps 1 and 2: BEFORE INSTRUCTION
- Step 3: During instruction
- Step 4: ONGOING Assessment



Step 1: Needs Assessment

- **Who** is my learner? **What** is their goal? **Where** do they need to use new information or skills?
- **Pre-Requisite Information:**
  - Does client know weight bearing status without support?
  - Can he state; Does he demonstrate
- **Learning Profile:**
  - Past experience
  - Motivation
  - Current cognitive abilities
  - Motor skills
  - Vision

Step 2: Design instruction

- Select functional, meaningful, relevant targets
- Assess stage of learning
- Break task down into component steps
- Select/sequence multiple examples
- Identify clear instructional wording/scripts

Step 3: Instructional Delivery

- Modeling
- Practice-Review
- Pacing
- Feedback
- Mastery

KEEP IN MIND!

Errorless Learning
Distributed Practice
Active Retrieval
Meta-Cognitive
Engagement
Variety of Stimuli

Step 4: Ongoing Assessment / Impact

- Conduct brief “skills check” /probe at the beginning of each session to determine retention.
- Focus treatment based on probe
- If errors emerge: isolate & model-practice until firm. Weave back into the skills sequence, as appropriate.
- Collect data
- Reflect/analyze patterns

KEEP IN MIND!
Cumulative review

CSI:

Clinician Self-Assessment of Instruction

Design (Step 1 & 2)

- ❑ Have I conducted a thorough ***Needs Assessment***?
- ❑ Does the client have ***"buy in"*** with the goals? (engagement)
- ❑ Do I have ***enough time*** to work with the client? (Is it realistic to design & deliver instruction to facilitate change in client behavior given my caseload, schedule, etc.?)
- ❑ Am I attempting to address ***too many goals/objectives/targets?*** (Is my treatment scattered and there's not enough time to focus on any one thing?)
- ❑ Have I clearly defined the ***nature of the instructional target*** (fact/concept; multi-step skills/procedures; strategies)?
- ❑ Do I conduct an ***initial assessment*** of the instructional target then ***break it down*** into its component parts/steps? (task/instructional analysis)
- ❑ Do I select and carefully sequence a ***sufficient number of training examples***?
- ❑ Do I have a script or guide to help keep my ***instructional wording clear, simple, and consistent***?
- ❑ Do I ***program for maintenance and generalization*** from the outset of treatment?

DELIVERY (STEP 3)

- ❑ Do I ***prevent errors*** from occurring while the client was learning the target?
  - ❑ Do I provide a ***sufficient number of models*** before the client attempts the target? (Unless conducting an assessment, I don't let them figure it out by trial and error.)
  - ❑ Do I ***carefully fade my support*** (cues/prompts)?
  - ❑ If the client makes an error, do I provide ***immediate, corrective feedback?***
  - ❑ Do I keep my instructional ***wording simple, clear, and consistent***?
- ❑ Do I conduct a ***cumulative (comprehensive) review*** of all the steps learned so far?
- ❑ Do I ***chain the steps*** together? (primarily for multi-step skills)
- ❑ Do I give the client plenty of opportunities to ***correctly practice*** the target several times?
- ❑ Do I ***distribute the practice trials*** over time?
- ❑ Do I provide the opportunity for ***client self-evaluation***?
- ❑ Do I conduct ***training in the environments*** in which the instructional target will be used?

IMPACT (STEP 4)

- ❑ Do I conduct a ***quick assessment (probe)*** at the beginning of each treatment session to determine retention and guide my instruction for the session?
- ❑ Do I assess for ***maintenance & generalization*** of the instructional target?
- ❑ Do I ***modify my instruction*** according to my data? (If client isn't progressing, how do I change my design and/or delivery of instruction to facilitate client success?)

Modified from:
Ehlhardt, Sohlberg, Glang, & Albin (2005)
Lemoncello & Sohlberg (2005)
Sohlberg & Turkstra (in press)
Stein, Carnine, & Dixon (1998)

INSTRUCTIONAL PACKAGE

Sample daily routine and specific app task analysis

Functional Routine Analysis	Basic Skill Task Analysis (Step 3 of Routine)
1. Recognize situation. (Example: “If I want to share about my day, I need photo supports.”) 2. Locate device. 3. Enter info into app *(See Basic Skill Task Analysis).* 4. Initiate use as support during conversation.	** See form 7.2 Task analysis

FORM 7.2

Instructional Planning Worksheet for External Cognitive Aids

External Aid: iPad with Sounding Board

Primary Function	Requisite Skills	Impact/Goal	
		Short-term	Long-term
Increase participation in sharing personal stories with communication partners	- operate touch screen on iPad - use Photo app	The client will create a communication board in an AAC application for story telling using real photographs from his daily routines	The client will use an iPad with AAC app to increase his participation in sharing personal stories with communication partners

Long-Term Goal: The client will use an iPad with AAC app to increase his participation in sharing personal stories with communication partners

Initial Acquisition Objectives: The client will follow 4-5 steps in a multiple part procedure with 90% accuracy across opportunities

(Specify target, approach, objective performance, independence, criterion, and context/conditions.)

WHAT will I teach the client to do? (Use of Tool)

Task Analysis (List Steps)

Take a photograph using the iOS photo app	
Create a new communication board in Sounding Board	
Create and program buttons in communication board	
Saving communication board	

☑ Plan is customized to client

☑ Context/antecedent specified

☑ Progress measurement specified in long-term goal and/or acquisition objectives

Plan to enhance client motivation/engagement:

- use personal interests
- use daily routines
- have communication partners encourage him to share about day once per day

(cont.)

Instructional Planning Worksheet for External Cognitive Aids *(page 2 of 2)*

Plan to involve environmental supports:

WHEN and HOW will I teach the instructional target?

Therapy Frequency: 2 / week
Session Duration: 60 min
Therapy Duration: 10 Sessions, Weeks, Months

☑ There is opportunity for sufficient practice within sessions
☑ There is opportunity for sufficient practice across sessions

List materials needed to practice using tool and plan for varying stimuli with sufficient examples:

- iPad with Sounding Board
- objects for practicing taking photographs on camera

What is the plan for progressing from modeling to distributed practice?

- carry over practice at home practicing each main step:

1. take photographs on iPhone
2. add board
3. add buttons with photographs
4. save board

WHERE will the tool ultimately be used?	in the home and community 1. with familiar communication partners 2. with unfamiliar communication partners
WHO will support training and tool use?	speech-language pathologist, caregiver
Describe context:	The patient lives at home with his wife and children. He participates in community events such as aphasia community groups and local gardening club.
Describe plan to train support people:	- In-person training will provided to patient, caregiver, and children (when possible/available) - Resources for programming and troubleshooting application will be provided to family members - Opportunity at the beginning of each session for caregiver questions will be alloted to support carryover practice at home.

FORM 7.3

Initial Assessment Worksheet for External Cognitive Aids

Initial Assessment

Client: DM Date: 9/25/2018

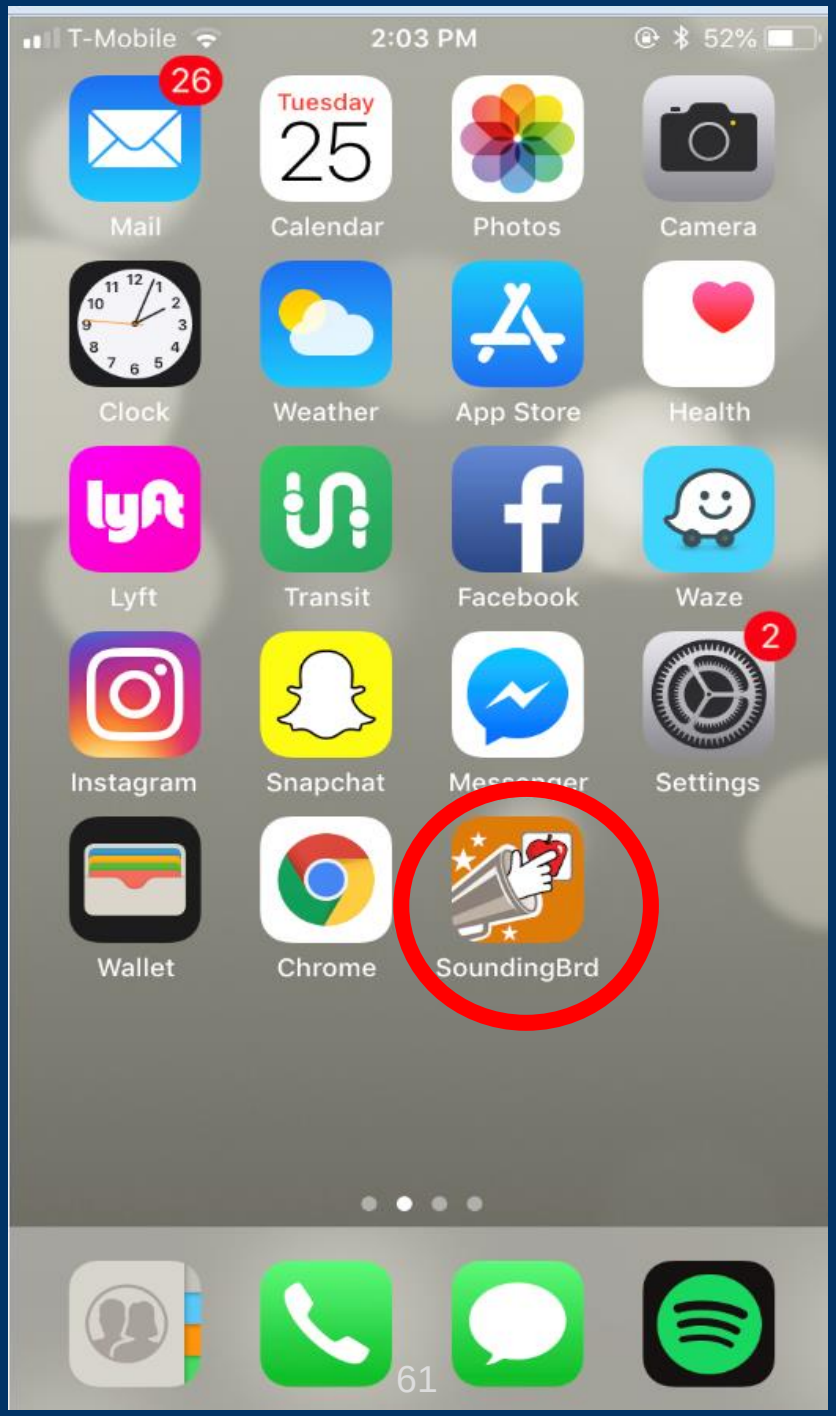
External Aid: iPad with Sounding Board

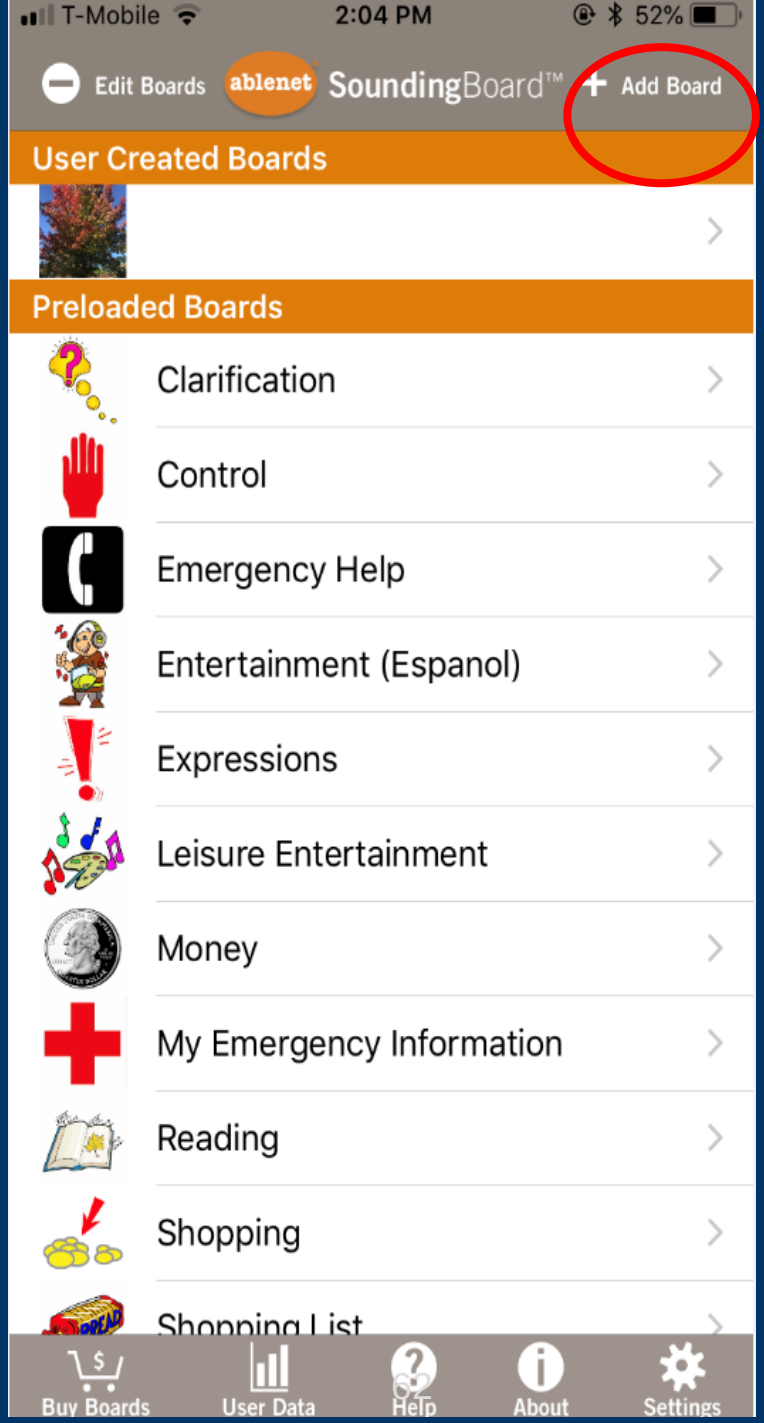
Antecedent to Use Aid:

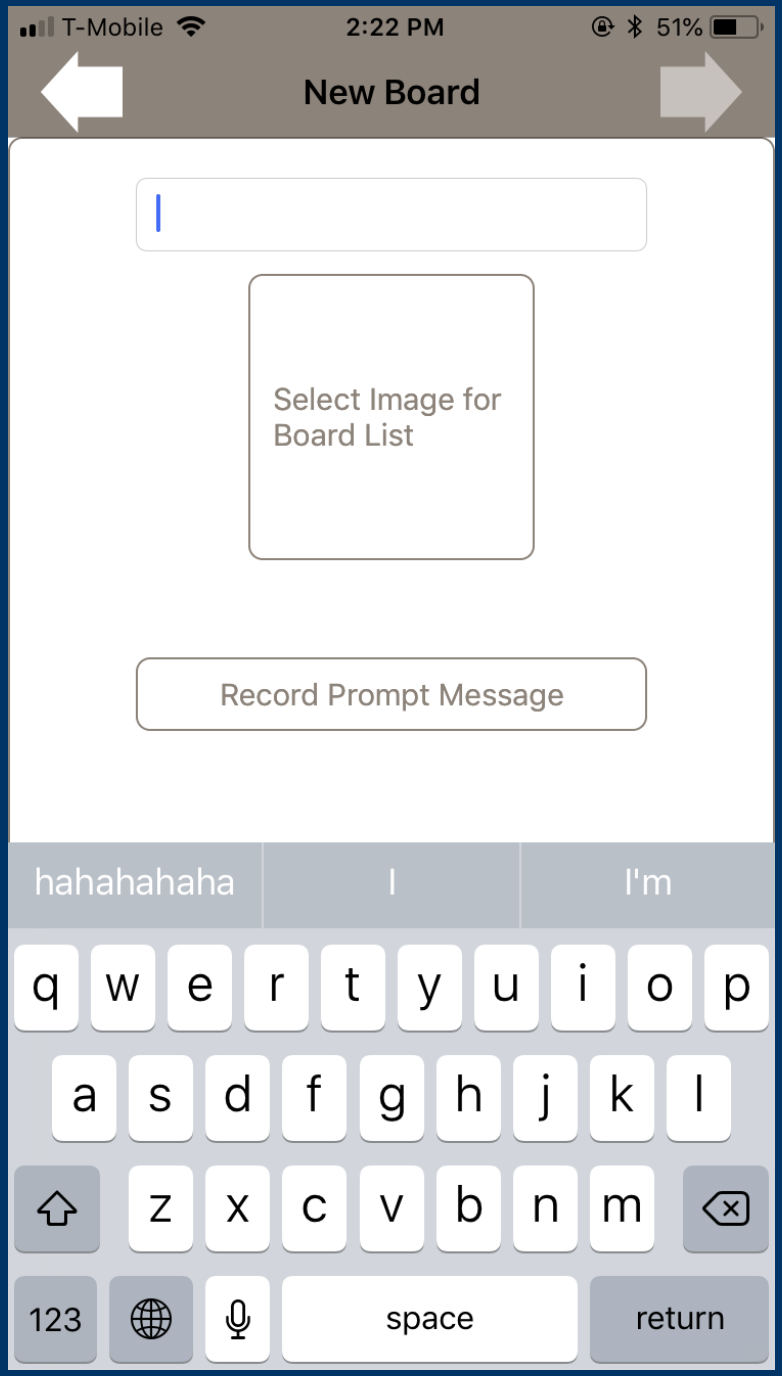
LIST STEPS	ACCURACY (+/–/cued)	COMMENTS
TAKE A PHOTOGRAPH IN PHOTO APP		
1. Unlock IPhone		
2. Locate Photo app symbol and touch the app to open		
3. Click the circle on bottom of screen to take picture		
ADD A BOARD IN SOUNDING BOARD		
4. Locate Sounding board app symbol and touch the app to open		
5. Press "Add Board"		
6. Press text board for "Board Name" and enter a space		
7. Press "select image for board list"		
8. Select "Pick from photo library"		
9. Locate picture in photo app and touch the image		
10. Click "choose"		
11. Click record prompt message and record silence		
12. click stop recording when finished		
13. click the right arrow on the top of the screen that appeared		
ADD MULTIPLE BUTTON TO COMMUNICATION BOARD		
14. Click "Add Image" to add a new button		
15. Click "Add Image" to select photograph		
16. Select "Pick from Photo library"		
17. Locate camera roll folder and touch to select		
18. Locate picture within camera roll and touch to select		
19. Click "choose" in upper right hand corner to select photo		
20. Click message name and type a space		
21. Click record message to record silence		
22. Click stop recording to save message		
23. click arrow to save		
24. Repeat stpes 14-23 for each button		
SAVE COMMUNICATION BOARD		
25. Click arrow in top right hand of screen to save		

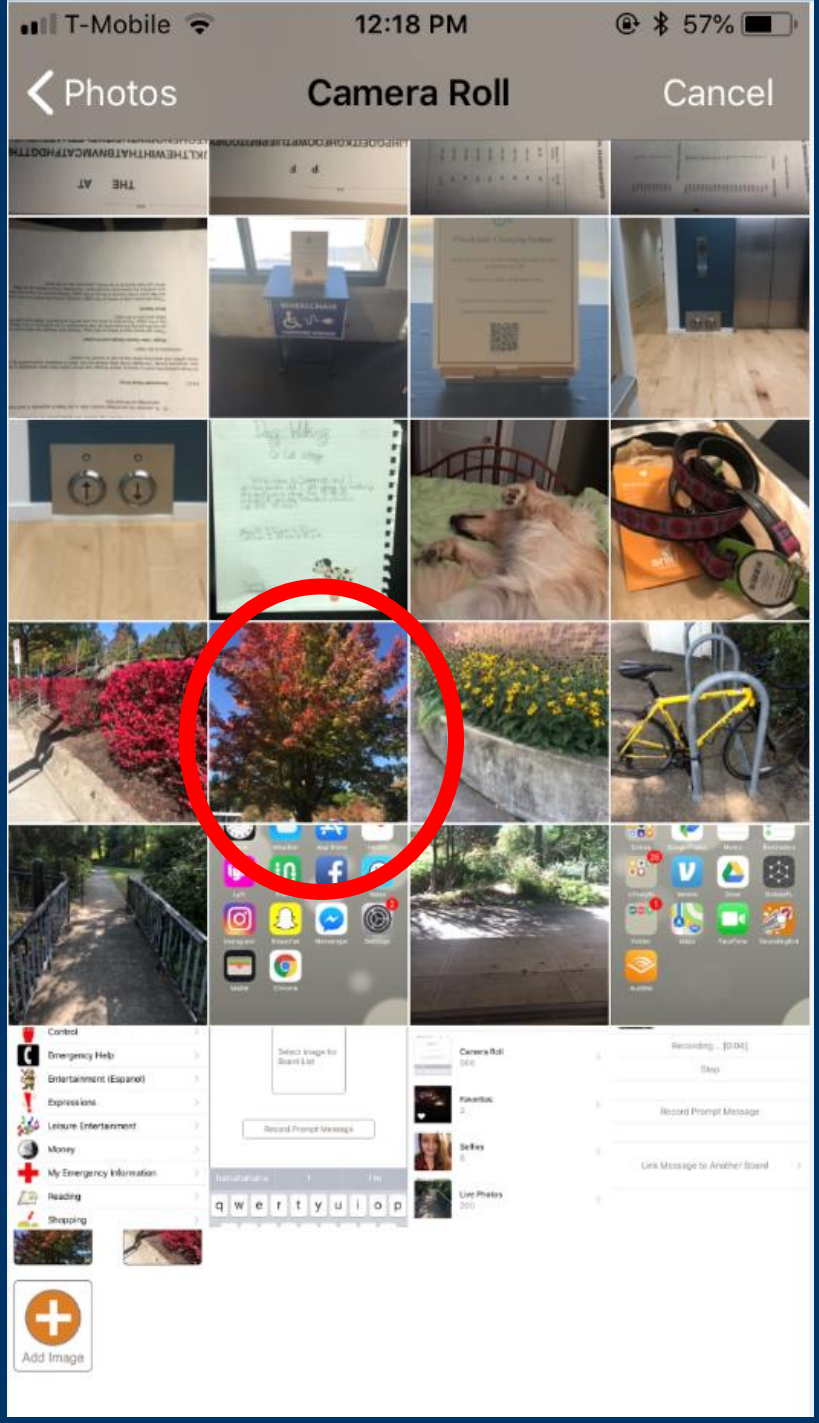
Baseline: ____/____

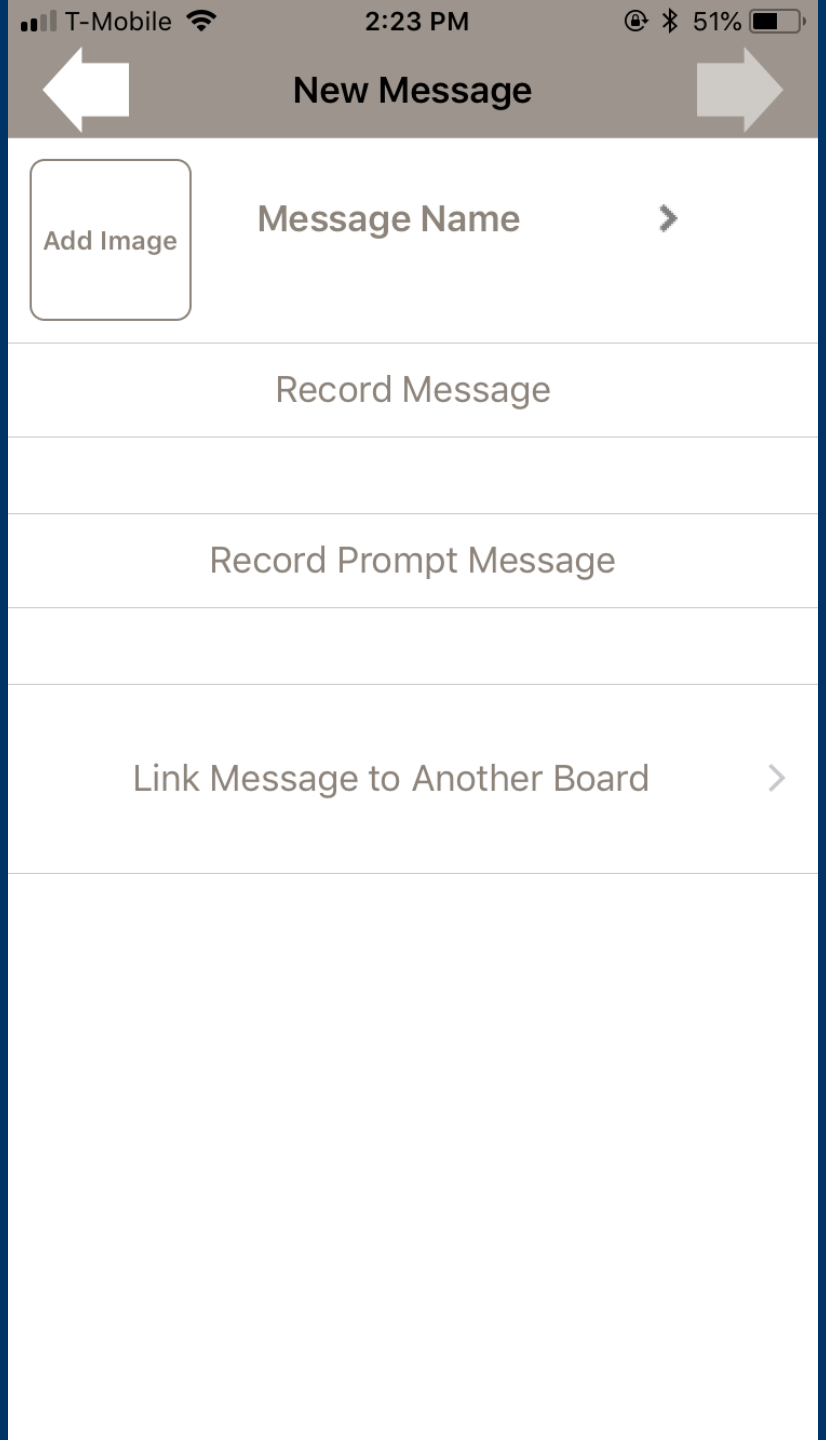
(cont.)

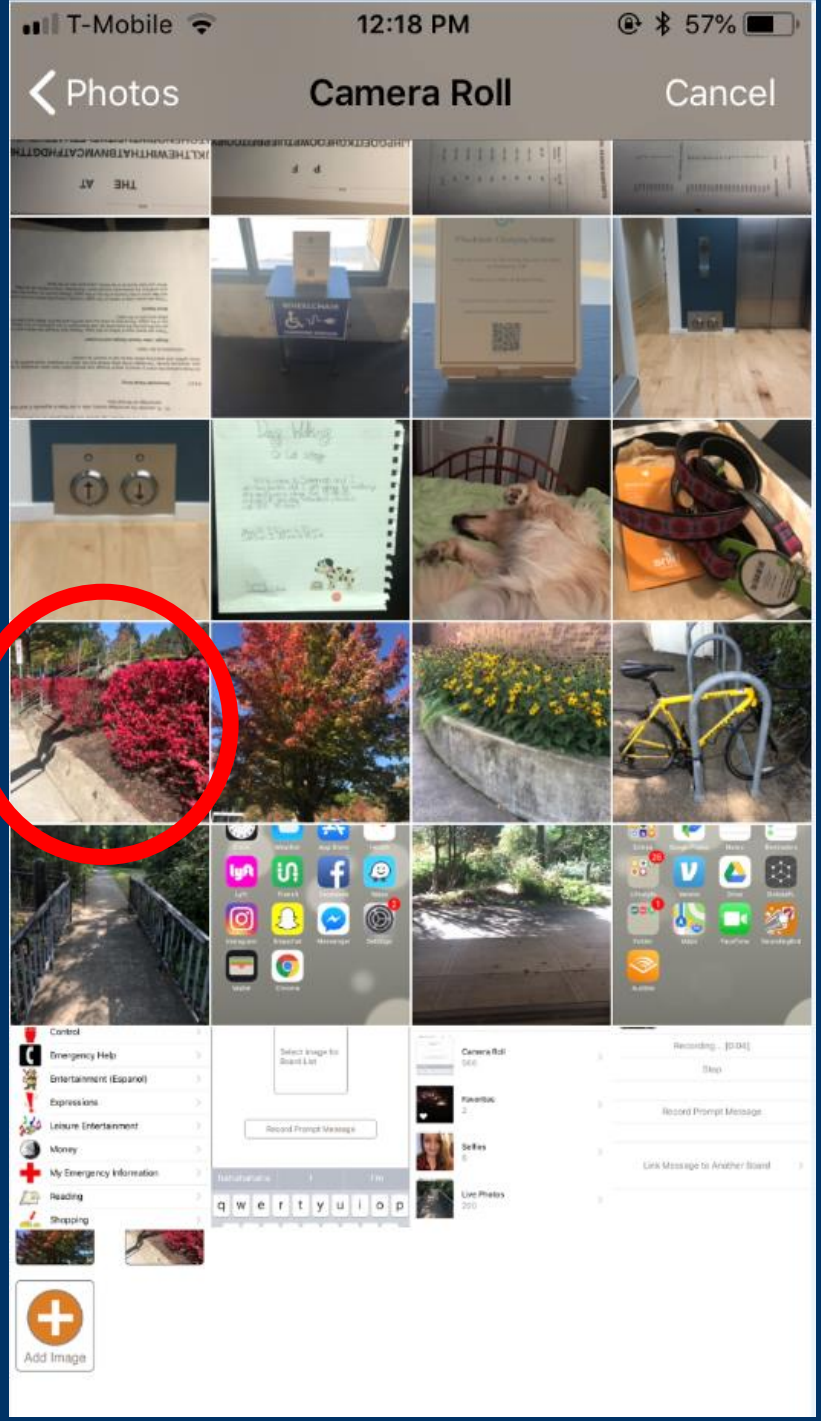

T-Mobile
2:03 PM
52%
26
Mail
Tuesday
25
Calendar
Photos
Camera
Clock
Weather
App Store
Health
Lyft
Transit
Facebook
Waze
Instagram
Snapchat
2
Settings
Wallet
Chrome
SoundingBrd


T-Mobile
2:04 PM
52%
Edit Boards
ablenet
SoundingBoard™
Add Board
User Created Boards
Preloaded Boards
Clarification
Control
Emergency Help
Entertainment (Espanol)
Expressions
Leisure Entertainment
Money
My Emergency Information
Reading
Shopping
Shopping List
Buy Boards
User Data
Help
About
Settings


T-Mobile
2:22 PM
51%
New Board
Select Image for Board List
Record Prompt Message
hahahahaha
I
I'm
q w e r t y u i o p
a s d f g h j k l
z x c v b n m
123
space
return


T-Mobile
12:18 PM
57%
Photos
Camera Roll
Cancel
Add Image


T-Mobile
2:23 PM
51%
New Message
Add Image
Message Name
Record Message
Record Prompt Message
Link Message to Another Board


T-Mobile
12:18 PM
57%
Photos
Camera Roll
Cancel
Control
Emergency Help
Entertainment (Espanol)
Expressions
Leisure Entertainment
Money
My Emergency Information
Reading
Shopping
Add Image

Hold and drag to rearrange messages.

Add Image

CO-CHAT App Operations: Mastery Demonstration Sheet

Client: _____

General iPad Mastery: (+/-)	**Initial Training**								
Demonstrate touch with pad of finger, not fingernail									
Demonstrate light, single touches.									

INITIAL TRAINING (Goal = 90%)

Date:_____	**LEVELS of CUEING**		
	Independent	**Verbal Instructions**	**Direct model with tactile and verbal cues**
To get the app working, first Press Home Button			
Press Arrow to Slide Open			
Press CO-CHAT Icon			
Find your initials to choose your participant set (cued by RA)			
Now we're going to practice taking a new picture : Press 'New Photo'			
Press anywhere to take photograph *hold iPad in landscape orientation with the home button on right side*			
Press and hold unwanted photo and press delete.			
Press the BACK button			

Levels of cueing: Least amount of support to most:

Independent

Verbal Instructions: Verbally state, "Remember, you need to press the _____ to make it _____. Please press '_____'.

Direct Model with Tactile and Verbal Cues: Verbally repeat the instruction and physically touch the desired location on the iPad. "So, in order to get the iPad to _____, I have to press with the pad of my finger on the _____."

ACKNOWLEDGEMENTS

NIH/NIDCD R21 project: R21DC01099

RERC project: NIDILRR 90RE5017

Q & A

Contacts

The list of people you know, and their phone number, etc.

Did you know?

You can add a lot to contacts:

- Pictures
- Address
- Email
- Relationship
- Nicknames
- Important dates

Photo Album

Where your camera photos are stored

Did you know?

Your photo album can also tell you:

- Where you took a picture
- When you took a picture
- Face recognition

Weather

You can see the weather if you save a location

Did you know?

You can add many locations.

If you want to talk about it later, take a screen shot.

Maps

More than giving you directions

Did you know?

Your maps can show you:

- Important places
- Where you parked your car

Apps

that come on your mobile device

Definitions

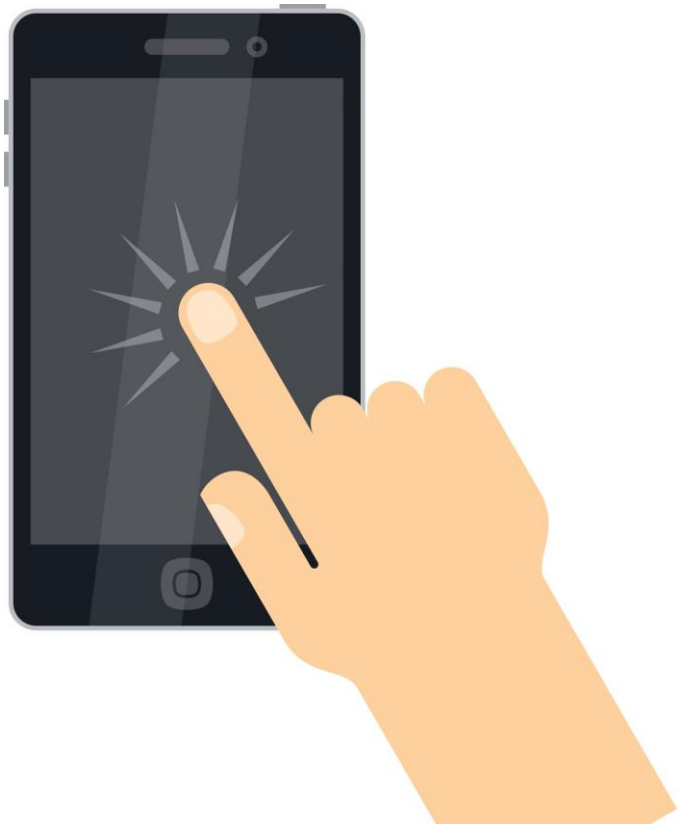
- A **mobile device** is your smart phone or tablet.
- An **app** is a special software for your phone or tablet.
    - Some **apps** can be downloaded and added to your device.
    - Some **apps** are already **on your device.**

Technology Check

- **Do you know….**
  - How to turn your device off and on?
  - What sound it makes?
  - When the battery is low?
  - How to turn the silent mode on and off?
  - How to use the camera?

Try it!

- Take out your device
- complete the checklist



Why mobile devices?

- iPhone and iPad are tools that help us **participate**.
- You always have them with you.
- So does everyone else!

Apps that come on your device

- Text messaging
- Email
- Internet browser
- Camera
- Contacts
- Photo album
- Maps
- Weather

Apps that come on your device

- **Contacts** – the list of people you know
  - Your contacts are more than a name and a phone number
  - You can add:
    - Pictures
    - Address
    - Email

Apps that come on your device

- **Photo Album**
  - Where your camera photos are stored
  - Your photo album can also tell you:
    - Where you took a picture
    - When you took a picture
    - Face recognition

Apps that come on your device

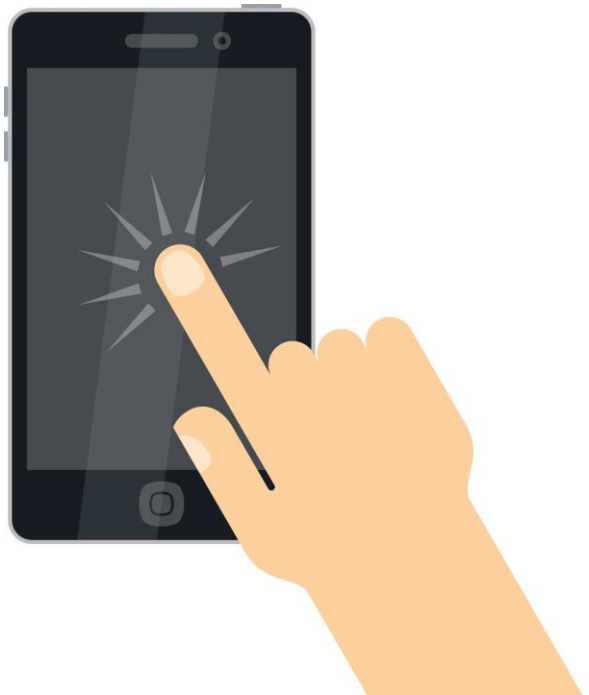
- **Maps**
  - More than giving you directions
  - Your maps can show you:
    - Important places (saved addresses)
    - Where you parked your car

Apps that come on your device

- **Weather**
  - You can see the weather if you save a location
  - Want to talk about it later?
    - Take a screen shot

Try it!

- **Take out your device**
- **Choose 1 or 2 apps** to use in conversation about this past weekend
- **Answer these 3 questions**:
  - **Where** did you go?
  - **Who** were you with?
  - **When** did you go?



Discussion

- What apps did you use?
- What app worked best?
- When can you use this tool?

PREVENTING DEVICE ABANDONMENT

Person

- Determined/motivated to be & stay independent
- Comfortable with technology
- Need for regular use

Environment

- Effective training to use device & demonstrate impact
- Supportive, patient communication partners
- Encouragement for all to use same ‘language’

Device

- Available, flexible, durable, affordable, customizable
- Simple, reliable, inconspicuous, easy to find if lost
- Easy to upgrade & maintain

(Evans et al., 2003; Hart et al., 2004; Heller et al., 2007; Scherer et al., 2005)