Application of Systematic Instruction for training AAC in adults

Aimee R. Mooney, M.S. CCC-SLP/L
USSAAC
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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.
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min</td>
<td>Introduction of Speaker, USSAAC and topic</td>
</tr>
<tr>
<td>5 min</td>
<td>Setting the stage: same page AAC</td>
</tr>
<tr>
<td></td>
<td>Thinking about thinking</td>
</tr>
<tr>
<td>5 min</td>
<td>Variables that support intervention success</td>
</tr>
<tr>
<td>15 min</td>
<td>Systematic Instruction</td>
</tr>
<tr>
<td>5 min</td>
<td>Stages of Learning</td>
</tr>
<tr>
<td>10 min</td>
<td>Case Example</td>
</tr>
<tr>
<td>5 Min</td>
<td>Q &amp; A</td>
</tr>
</tbody>
</table>
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”

- Augmentative
- tools
- strategies
- Communication supports
- aids
- Alternative

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5 w’s of AAC

Who

What

Why

Where

When

AAC

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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
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 communication methods?
- Willing to teach others how to communicate with individual?

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)

- Paper and pencil
- Communication books, boards and cards
- Speech generating devices
- Mobile technologies and apps

Think about INSTRUCTION

flexible

multi-modal
WHERE

ICU

work

home

Assisted living

Volunteer

Community

Think about INSTRUCTION
WHERE: Considerations

Settings

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

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

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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?

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

The patient is NON-COMPLIANT!
Consider all elements of learning & instruction

Let’s set up the environment, learner & the instruction for PARTICIPATION SUCCESS!

Instruction Characteristics

Learner: Personal Characteristics

Teacher: Personal Characteristics

Task Characteristics

Program Characteristics

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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

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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 = \textbf{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

<table>
<thead>
<tr>
<th>Principles</th>
<th>Stages of Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroplasticity</td>
<td>Acquisition</td>
</tr>
<tr>
<td>Errorless Learning</td>
<td>Mastery</td>
</tr>
<tr>
<td>Distributed Practice</td>
<td>Maintenance</td>
</tr>
<tr>
<td>Active Retrieval of Memories</td>
<td>Generalization</td>
</tr>
<tr>
<td>Meta-Cognitive Engagement</td>
<td></td>
</tr>
</tbody>
</table>
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!

**GOAL of Errorless Learning:**

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).


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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 relevant…
## 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

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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

Steps 1 and 2: Design Instruction

Step 3: Needs Assessment

Step 4: Instructional Delivery

Target skill

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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

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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
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)
Sample daily routine and specific app task analysis

<table>
<thead>
<tr>
<th>Functional Routine Analysis</th>
<th>Basic Skill Task Analysis (Step 3 of Routine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Recognize situation. (Example: “If I want to share about my day, I need photo supports.”)</td>
<td>** See form 7.2 Task analysis</td>
</tr>
<tr>
<td>2. Locate device.</td>
<td>**</td>
</tr>
<tr>
<td>3. Enter info into app (See Basic Skill Task Analysis).</td>
<td>**</td>
</tr>
<tr>
<td>4. Initiate use as support during conversation.</td>
<td>**</td>
</tr>
</tbody>
</table>
**External Aid:** iPad with Sounding Board

<table>
<thead>
<tr>
<th>Primary Function</th>
<th>Requisite Skills</th>
<th>Short-term</th>
<th>Long-term</th>
</tr>
</thead>
</table>
| 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 storytelling 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
- [x] 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

(continuation...)

Copyright 2011 by The Guilford Press. All rights reserved. Permission to reproduce this form is granted to purchasers of *Optimizing Cognitive Rehabilitation: Effective Instructional Methods* by McKay Moore Sohlberg and Lyn S. Turkstra for personal use only (see copyright page for details).
Plan to involve environmental supports:

**WHEN and HOW** will I teach the instructional target?

<table>
<thead>
<tr>
<th>Therapy Frequency:</th>
<th>2 / week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session Duration:</td>
<td>60 min</td>
</tr>
<tr>
<td>Therapy Duration:</td>
<td>10 Sessions, Weeks, Months</td>
</tr>
</tbody>
</table>

☑ 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
  - with familiar communication partners
  - 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 be 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 allotted to support carryover practice at home.
## Initial Assessment Worksheet for External Cognitive Aids

**Client:** DM  
**Date:** 9/25/2018

**External Aid:** iPad with Sounding Board

**Antecedent to Use Aids:**

## LIST STEPS | ACCURACY (+/-/cued) | COMMENTS
--- | --- | ---
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 |  |  
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 arrows on the top of the screen that appeared |  |  
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 steps 14-23 for each button |  |  
25. Click arrow in top right hand of screen to save |  |  

**Baseline:** ____/ ____
New Board

Select Image for Board List

Record Prompt Message

hahahahaha

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
CO-CHAT App Operations: Mastery Demonstration Sheet

Client: ______________

<table>
<thead>
<tr>
<th>General iPad Mastery: (+/-)</th>
<th>Initial Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate touch with pad of finger, not fingernail</td>
<td></td>
</tr>
<tr>
<td>Demonstrate light, single touches.</td>
<td></td>
</tr>
</tbody>
</table>

**INITIAL TRAINING** (Goal = 90%)

<table>
<thead>
<tr>
<th>Date: __________</th>
<th>LEVELS of CUEING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Independent</td>
</tr>
</tbody>
</table>

- **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 smartphone 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)