

SYSTEMATIC INSTRUCTION OF ASSISTIVE TECHNOLOGY FOR COGNITION (ATC) FOLLOWING TBI

Laurie Ehrlhardt Powell, PhD, CCC-SLP
Center on Brain Injury Research and Training
Western Oregon University, Eugene, OR

Michelle Ranae Wild, MS
Coastline Community College ABI Program
Costa Mesa, CA

Agenda

Part I - Laurie: (30 minutes)

- Introduction-rationale
- Overview of instructional design & delivery principles
- Overview of recent research

Part II - Michelle: (45 minutes)

- Overview of Making Cognitive Connections program (IOS systems)
- Video training examples
- Interview with client

Part III - Q & A (15 minutes)

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Learning Objectives

- Describe at least one key outcome of experimental research evaluating systematic instruction applied to ATC
- Describe at least one reason why a careful, person-centered needs assessment and design and delivery of instruction is critical to successful use of ATC
- Describe at least one example of the cognitive connection between a skill using ATC and another daily life skill

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Why focus on “Instruction?”

“... in particular the field (of cognitive rehabilitation) has neglected for over two decades the accumulated wisdom in educational psychology, special education, etc. This neglect has cost billions of dollars and yielded countless hours of largely unsuccessful intervention for people with TBI. We have an opportunity to turn this around.”

Mark Ylvisaker, personal communication, 2003

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An Instructional Package: TEACH-M!

Task analysis: Know your content. What is the target skill? Break it into small steps. Chain steps together.

Error control: Keep errors to a minimum during the acquisition phase. Don't let an error sneak by!

Assess performance: (initial)-assess skills before treatment; (on-going) - probe performance at the beginning of teaching session and/or before introducing a new step.

Cumulative review: Regularly review previously learned skills.

High rates of correct, distributed practice trials: 3-5 trials is not enough! 20-50 is more like it! Pace to learner's ability.

Meta-cognitive evaluation: Student's self-evaluation of one's own performance.

Ehrlhardt et al. (2005)

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The “Step 1-4” SI process: (a variation on TEACHM)

1. DESIGN – Before instruction – Conduct Needs Assessment (Who, what, why, when, where)
2. DESIGN – Before instruction – Design the instruction (type of instructional target, examples, wording) Component Skills/Pre-Reqs
3. DELIVER – Practice Makes Perfect (model, practice-review, pacing, feedback, mastery, location)
4. DELIVER – On-going assessment – Determine effectiveness (collect data, analyze patterns)

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Instruction: Research digest— Highlights

From Special Education

Engelmann & Carnine (1991)
Stein, Carnine, & Dixon (1998)
Swanson & Hoskyn (1998)

From Neuropsychological Rehabilitation

Wilson et al. (1994; 2003)
Sohlberg et al. (2007)
Ehlhardt et al. (2008)

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Types of Instructional Targets

Skills/Procedures (e.g., steps to use assistive device; safe swallowing steps)
◦ *Key Instructional Practices* = chain steps together into routine

Facts (e.g., orientation facts, personal information)
◦ *Key Instructional Practices* = repetition & distributed practice

Concepts (e.g., functional safety, thickened liquids)
◦ *Key Instructional Practices* = define boundaries (what it is & what it is not)

Strategies (e.g., homework routine; anger management)
◦ *Key Instructional Practices* = recognize when to implement strategy; self-question

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Skills/Procedures: Focus on ATC

ATC - External aids used to compensate for cognitive impairments. Examples:

- Programmable watches
- Pagers
- Voice recorders
- PDAs (personal digital assistants)
- Cell phones
- Smart phones

Why ATC? Research supports the use of external aids (Sohlberg et al., 2007) but minimal focus on how to train these.

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RECENT RESEARCH: SI APPLIED TO ATC

Ehlhardt Powell, Glang, Ettel, Todis, Sohlberg, & Albin (in press). *Systematic instruction following acquired brain injury: Results of a randomized controlled trial.*

NIH-NICHD Award #5R03HD54768 (2007-2010)

Recent Research: SI applied to ATC

Purpose of study:

To compare systematic instruction vs. conventional instruction (trial-and-error; discovery learning)

Instructional target - Multi-step procedures using assistive technology for cognition (Palm Tungsten E2 PDA)

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Research Questions

Does systematic instruction (SI) vs. conventional instruction (CI) (trial-and-error learning) applied to ATC result in:

- more accurate performance at post-test?
- better maintenance at 30-day follow-up?
- more efficient (fluent) performance?
- better generalization?
- higher satisfaction ratings based on post-training surveys? (non-experimental)

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Methods

- 29 completed study (15 SI: 14 CI); moderate-severe cognitive impairments due to ABI
- 17 males and 12 females (M= 42.31 yrs; range 20-68 yrs)
- Disability Rating Scale (DRS) (M=5.5 SI; M = 5.7 CI); Neuropsych testing for descriptive purposes
- Double-blind randomized controlled design
- Participants, evaluator, & coders blind to study condition
- Trainer (PI) and fidelity checkers not blind to condition

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Training

- Pre-test
- Training applied to Palm Tungsten E2 PDA
12 individual sessions, 45 min each, 2-3x per week, 4-6 weeks
- Post-test
- 30-days post (maintenance)

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Independent Variables (Training Conditions)

Systematic Instruction	Conventional Instruction
Limited range of instructional targets (calendar program only)	Broad range of instructional targets (calendar program plus)
Multiple training examples	Few training examples
Mastery emphasized	Mastery not emphasized
Exploration discouraged	Exploration encouraged
Step-by-step models; carefully faded support	Whole task model only
High rates of correct, distributed practice and review per target	Few practice opportunities per target
Immediate corrective feedback	Wait to give feedback
Training in different environments	Training in clinic setting only

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Dependent Variable (Outcome Measure) Pre, Post, and 30-days

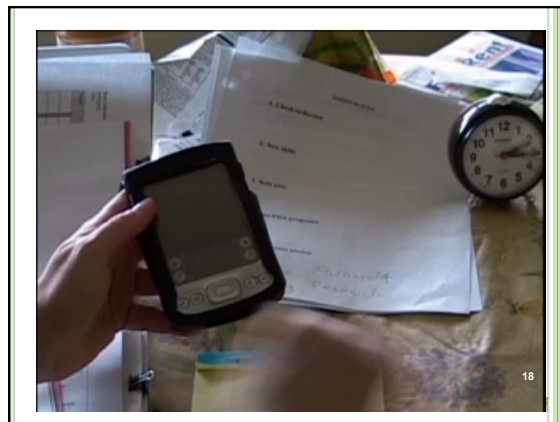
Sample Tasks		
Type	Task	Person/Environment
Checking information – calendar program	"What is your first appointment tomorrow?"	Evaluator – quiet space
Entering information – calendar program	"Enter this doctor's appointment."	Evaluator – quiet space
Checking information – calendar program	"What is your next appointment today?"	Another person/ environment
Checking information – calendar program	"Enter your next appointment with us."	Another person/ environment
Entering information-tasks program (generalization)	"Enter this new item on your task list"	Evaluator – quiet space

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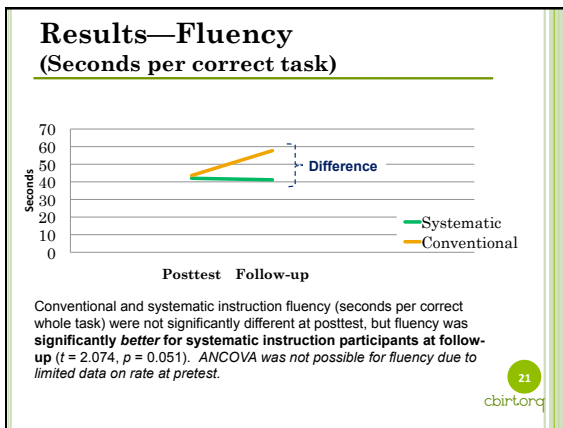
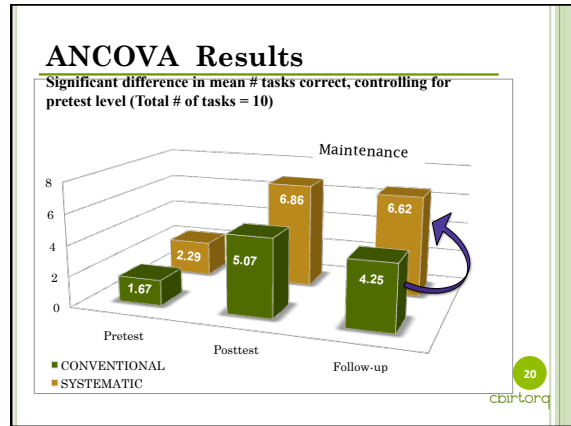


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RESULTS



Clinical Implications & Future Research

TAKE HOME POINT: Fewer, systematically taught training targets are preferable to several targets taught in a less systematic, exploratory fashion.

Replicate with higher number of participants, different trainers, different types of ATC, and additional follow up intervals.

Component analysis: Which instructional elements contributed most to study outcomes?

Experimental evaluation of impact of systematically trained ATC on daily life.

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Research to Practice: Train the trainers

Who are trainers of ATC?

- Caregivers
- Family members
- Job coaches
- Occupational therapists
- Speech-language pathologists
- Teachers/teaching assistants

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TRAINING ASSISTIVE TECHNOLOGY IN THE ENVIRONMENT (TATE)

TATE 2009-2012

NIDRR Development Project; Award# H133G090227

PROJECT STAFF

Laurie Ehlhardt Powell, PhD
Ann Glang, PhD
Bonnie Todis, PhD
Debbie Ettel, PhD
Robin Harwick, MS

CONSULTANTS

Rick Albin, PhD
Roberta DePompei, PhD
Marcia Scherer, PhD
McKay Moore Sohlberg, PhD
Michelle Ranae Wild, MS

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TATE – Year 1 (2009-2010)

Focus Groups & Structured Interviews;
Development & initial pilot testing of TATE ATC
Toolkit

Themes:

- Client motivation & support system
- Past experience & age matter
- Training considered important but doesn't routinely happen.
- Time is of essence for trainers; "5 minute rule"
- "Training the trainer"& trainer support system
- Don't stop at training just basics operations, **train strategic use/routines in the environment** as well.

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TATE – Year 2 (2010-2011)

**Pilot Testing of ATC Toolkit & Single Case
Experiments**

**Person-Centered Needs Assessment – Sample
items**

- Survey of Technology Use form (Scherer)
- PDA Intervention Plan (Gillette, DePompei, Goetz)
- TechMatch (Fox, Sohlberg et al.)

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TATE – Year 2 (2010-2011)

**Pilot Testing of ATC Toolkit & Single Case
Experiments**

Training – Sample items

- Training videos & scripts
- "Where do I start training?" checklist
- Lesson Plan (Sohlberg & Tursktra)

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TATE – Year 3 (2011-2012)

Continue single case experiments & field testing

- Single case experiments – focus on training for generalization
- Field testing – dissemination/evaluation of TATE ATC Toolkit for Trainers across several rehabilitation and supported living programs serving individuals with ABI nationwide.
- See handout for recruitment contact information.

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Part I - Summary

- Growing evidence that **instructional technology** is a critical component of successful, sustained use of ATC.
- There are evidence-based tools available to help guide the design and delivery of systematic instruction of ATC, regardless of the specific technology used (see *Fact of the Matter*).
- Transition to Part II and Michelle's work: Now let's look at device-specific materials that incorporate principles of systematic instruction.

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