The impact of cognitive functions on written expression on assessment and intervention: What does the research indicate?

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Objectives

• Describe research-based cognitive factors that related to written expression.

• Describe a variety of interventions for writing.

• Gain awareness of a new tool to move from assessment to intervention.
Review: What are the cognitive factors that underlie performance in written expression?

Building Blocks of Learning

Strategies
Language
Images
CONCEPTUAL
Phonology
Orthography
Motor
SYMBOLIC
Attention and Self-Regulation
Emotions
Behavior
Self-Esteem
FOUNDATIONAL

Writing Achievement Shown to be Related to:

- Graphomotor System
- Language / Auditory Processing / Phonological Awareness
- Working Memory/Short-term Memory
- Executive Functions
- Crystallized Intelligence
- Visual Processing (Orthographic)
- Long-term retrieval
- Processing Speed / Automaticity / RAN
- Fluid Intelligence

Integration of Processes
Coding Word Forms in Verbal Working Memory (Berninger, 2007)

![Diagram of word forms in verbal working memory]

Written Language Problems Based on a Working Memory Architecture (Berninger, 2007)

![Diagram of written language problems in a working memory architecture]
Additional Barriers to Writing

Research Classroom
Promote higher-level skills such as Organizing and developing ideas

Lower-level Skills like Transcription – AUTOMATICITY

Written Language Problems and the Three Word Forms

(Berninger, 2007)
Remedial vs. Compensatory Interventions
- Remedial Interventions
  - Have the expressed goal of correcting a deficit by directly addressing the area of weakness.
- Compensatory Interventions
  - Emphasize using the individual’s cognitive or memory strengths and assets, in an effort to bypass the deficit, thereby reducing its impact on learning and performance.
  - Strategy Training

Alphabet Retrieval Game for Improving Automatic Retrieval
PAL Intervention (User Guides)
- Name or Write the letter that comes after these letters: a, s, w, g, m.
- Name or Write the letter that comes before these letters: u, r, t, l, i.
Teach for Transfer to Composing

Important Instructional Design Features:
• Only practice each letter once in a lesson (avoids habituation)
• Always compose for 5 minutes and share with peers
Fast-Mapping Strategy
What does effective writing instruction look like?

• Motivation
  – Exciting/interesting,
  – risk-free environment
    ▪ students to select own writing topics or modify teacher assignments,
    ▪ developing assigned topics compatible with students' interests,
    ▪ reinforcing accomplishments and attempts
    ▪ specifying a goal for each lesson,
    ▪ promoting an "I can" attitude.

• Regular teacher/student conferences about writing topics
  – includes the establishment of goals or criteria to guide writing and revising efforts; use strategies and scaffolding

• A predictable writing routine where students are encouraged to think, reflect, and revise.
  – Cooperative arrangements where students help each other plan, draft, revise, edit, or publish written work.
What does effective writing instruction look like?

- Teacher and student modeling of the writing process and positive attitudes toward writing.
- Instruction covering a broad range of skills, knowledge, and strategies, including:
  - phonological awareness,
  - handwriting and spelling,
  - writing conventions,
  - sentence-level skills,
  - text structure,
  - the functions of writing,
  - and planning and revising.

What does effective writing instruction look like?

- Integration of writing activities across the curriculum and the use of reading to support writing development.

- Progress monitoring and communication
What does effective writing instruction look like?

- Written work is displayed
- Room has good quantity and quality of writing and reading material,
  - Word lists appear on the walls.
- Daily writing activities
  - Writing tasks for multiple audiences, including writing at home.

Planning & Writing

- Story Plans
  - Diagram of the important parts of a story
- Plans for Writing
  - Teach outline for writing sentences & supporting sentences
- Teach Sentence Openers
  - Idea generating questions
  - For example, Who, What, When, Where...
Sentence Level Ideas

http://msjordanreads.com/2012/02/26/fluency-boot-camp/

Writing webs

Plan a Timeline Piece
**Metacognition Training**

- The conscious use of executive control processes
- Two aspects of Metacognition:
  - Self-awareness
    - The knowledge of one’s skills and cognitive abilities, understanding how one’s skills and abilities match up with task requirements, and knowing which processes and strategies will lead to successful goal attainment.
  - Self-control
    - The ability to consciously monitor, manage, control, and evaluate one’s cognitive activities and select strategies for use.

**Metacognitive Training**

- Key aspects of metacognitive interventions include teaching the individual:
  - To become aware of his/her processing deficits and strengths;
  - To select an appropriate strategy for the task at hand;
  - To self-monitor progress toward an objectives;
  - To revise or change the strategies when necessary;
  - To self-evaluate.
Memory Interventions

• Rote Strategies
• Relational Strategies
• Phonological STM Interventions
• Verbal WM Interventions
• Visuospatial Working Memory
• Executive Working Memory
• Mnemonics
• Long-term Memory
• Phonological Processing

Working Memory Training

An Evidence-based intervention for working memory training.

www.cogmed.com
Rote vs. Relational Strategies

• Rote Strategies:
  – Basic rehearsal strategies (e.g., simple repetition)
  – Minimal demands on WM resources
  – Primary purpose of maintaining items in phonological short-term memory
  – Simple to teach and learn

• Relational Strategies
  – Involves higher level WM processing
  – Increased retention of information
  – Mnemonics; visual imagery
  – Attaching meaning to information

Phonological STM Interventions

• Naming letters and objects
• Repeating spoken sentences
• Reciting nursery rhymes
  – Highlights the phonological structure of language
• Rhyming games
  – Enhance phonemic awareness and the ability to store phonological information
Verbal Working Memory Interventions

• Elaborative Rehearsal
  – Associate meaning with stimuli
  – Keeps information active in WM without repetition and also facilitates moving information to LTM.

• Semantic Rehearsal
  – Brief sentences using the word to be remembered

Verbal Working Memory Interventions

• Chunking
  – Pairing, clustering, grouping, or association of different items into units that are processed and remembered as a whole; thereby facilitating short-term retention and encoding into long-term storage.

• Paraphrasing
  – A strategy that builds off of both rehearsal and chunking. Students restate information in their own words; requiring that they reorganize and condense a large amount of linguistic information into smaller, well-integrated, and more personally meaningful units.
Mnemonics

• Visual Imagery
  – Involves transforming verbal content into visual information
  – Beneficial when used with students who have language deficits or deficits in verbal WM

• Pegwords
  – Numbers from one to ten are associated with pictured rhyming words (e.g., “one-bun, two-shoe”)
  – Good strategy or remembering numbers & sequences

• Loci
  – Memorize order of rooms; associate items to be remembered with each room
What does effective writing instruction look like?

- Teachers provided personalized assistance such as
  - scaffolding and guidance designed to help refine and extend writing skills.
    - teachers spent extra time explicitly teaching about letter-sound relationships.
DESCRIPTION OF SUBTYPE: MIXED PHONOLOGICAL/ORTHOGRAPHIC

...pattern of performance across key cognitive, language, and academic domains is similar to that of students with a mixed phonological and orthographic deficit. Students with a mixed deficit have difficulty mentally representing the sound patterns of the words in their language, which causes great difficulty in using the phonological route to reading and spelling, as well as difficulty in using the visual-lexical route to reading and writing words.
### Strengths and Needs

#### Relative Strengths
- General or nonverbal cognitive functioning (typically average or above average)
- Listening Comprehension
- Verbal comprehension and reasoning
- Auditory-verbal working memory
- Perceptual reasoning
- Oral grammar (morphology and syntax)
- Processing speed

#### Weaknesses
- Phonological processing
- Decoding/Nonsense word reading
- Word recognition accuracy
- Spelling
- Orthographic coding
- Reading comprehension
- Reading fluency
- Naming speed
- Handwriting

### Interventions from General to Specific

Utilize areas of strength when addressing areas of weakness

...A "strength model" that seeks to remediate weaknesses through strategies and methods that utilize a student’s cognitive processing strengths is preferred (65,100).

Examples of how to utilize X's strengths to remediate weaknesses include:

*When selecting contextual reading materials to use during instruction, build upon X's knowledge, curiosity, and intellect by selecting a wide variety of texts that cover many different subject areas. Encourage reading for different purposes such as learning, entertainment, and communication with others. Similarly, plan writing assignments with a variety of different purposes and audiences in mind.*
Research-Based

Consider teaching phonological awareness using a phonics (letter + sound) approach

.....Some students with weak phonological processing may improve their auditory perception of phonemes when the printed word is used because the letters help them detect differences that they do not perceive auditorily (65). Some research in improving literacy skills suggests that teaching phonological awareness with letter training (i.e., connecting sounds with letters) may be more effective than emphasizing intrasensory phonological awareness activities (e.g., playing oral phonemic awareness games) (30).


Teach Handwriting

Show X a letter and then cover it up. Ask X to visualize the letter in his mind, and then write the letter from memory. Finally, compare the written letter to the model, and revise if necessary. Teach X to name the letter or letter sound at each step to facilitate retrieval fluency.

Teach visual (orthographic) processing strategies

• Improve attention to taught vowel patterns
  – present pairs of words that differ only by their vowel type.

• Present word pairs simultaneously (stacked or side-by-side) or using flip strips or letter cards to change the vowel of the word.
  – Teaching short and long vowel patterns?
    ▪ present pairs such as bit/bite, cub/cube (VCE)
    ▪ or sit/seat, met/meat (ea vowel team), or ran/rain, pan/pain (ai vowel team).

Teaching Visual Skills

When designing instruction for visual skills:

• Emphasize the special visual details of letters and words to be learned.
  – Use color coding, bolding, spacing, drawings, pictures

• Use the VAKT method to provide varied sensory input for recall of letters and words.
  – Use music and rhythm, body movement, tracing, use of sandpaper or cotton to trace

• Use visual imagery, or visualization, to help students recall what they have seen.

• Whenever possible, associate words to be learned visually with objects, pictures, and demonstrations.
EXAMPLES OF EVIDENCE-BASED PROGRAMS

ALPHABETIC PHONICS (35,50)
Author: Cox, A. R.
Publisher: Educators Publishing Service
Category: Phonological Processing, Oral Expression, Decoding, Comprehension, Spelling, Handwriting
Age Range: 4-14
Grade Range: PK-8

CORRECTIVE READING (SRA) (55,119)
Publisher: SRA/McGraw-Hill
Category: Phonological Processing, Decoding, Vocabulary, Comprehension, Fluency
Age Range: 8-17+
Grade Range: 3-12+

- Graham, Harris, & Larsen. Prevention and Intervention of Writing Difficulties for Students with Learning Disabilities (http://www.ldonline.org/article/6213/)
- http://www.interventioncentral.org/academic-interventions/writing
Customer Service
1-800-627-7271 (USA)
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