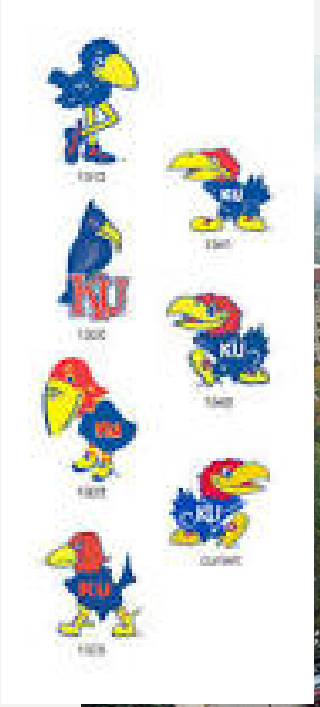
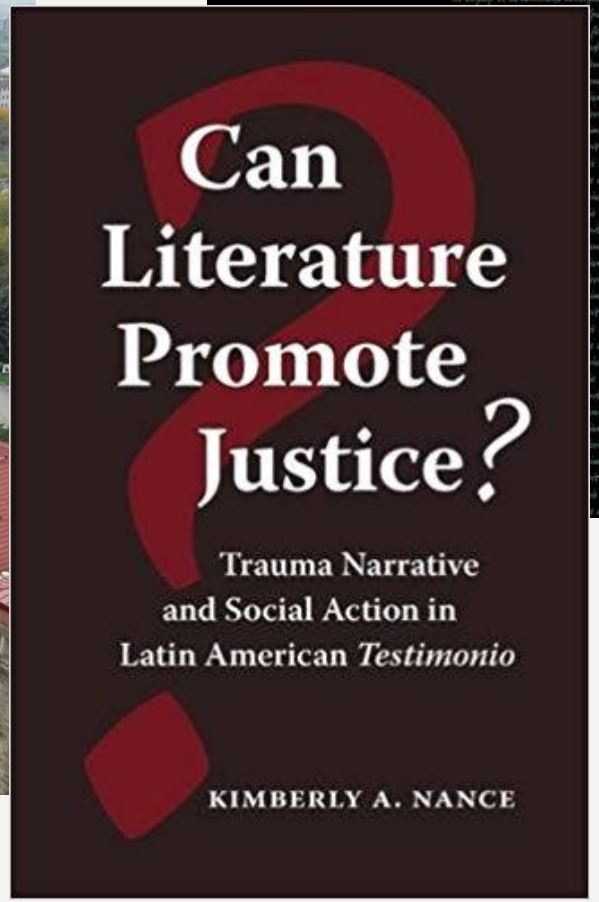
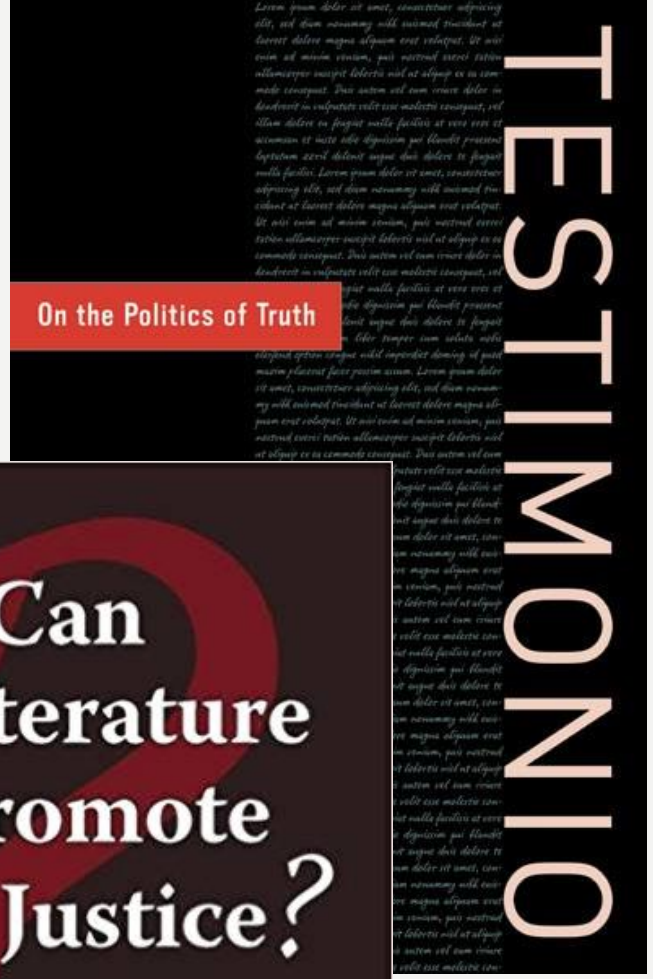
AAC THINK TANK

RACHEL HOGE, M.A.,CCC-SLP
FLORIDA STATE UNIVERSITY
SCHOOL OF COMMUNICATION SCIENCE AND DISORDERS

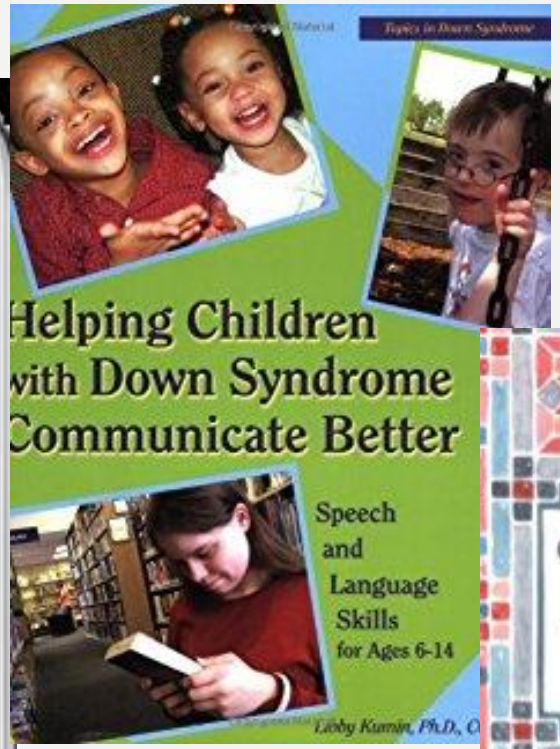
Academic Background

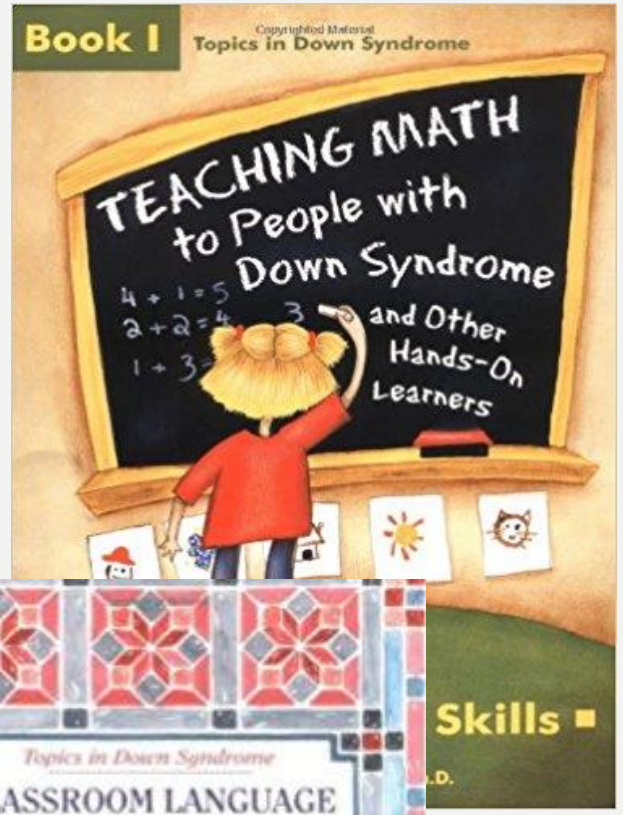


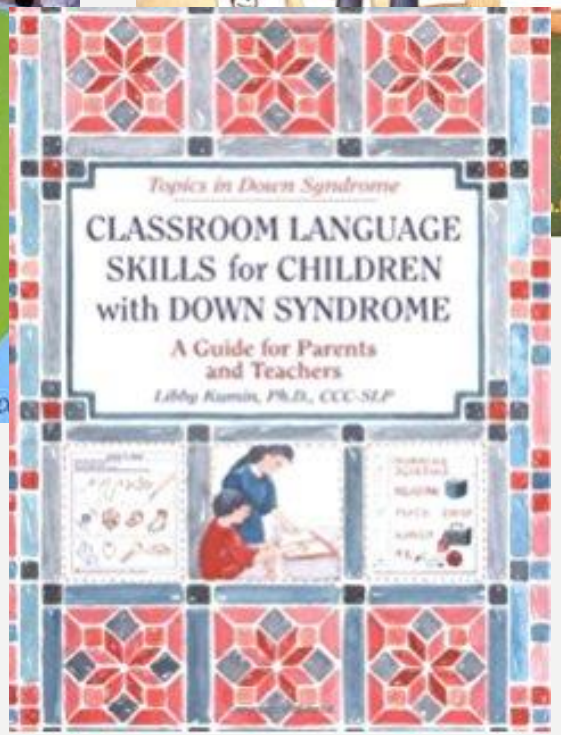




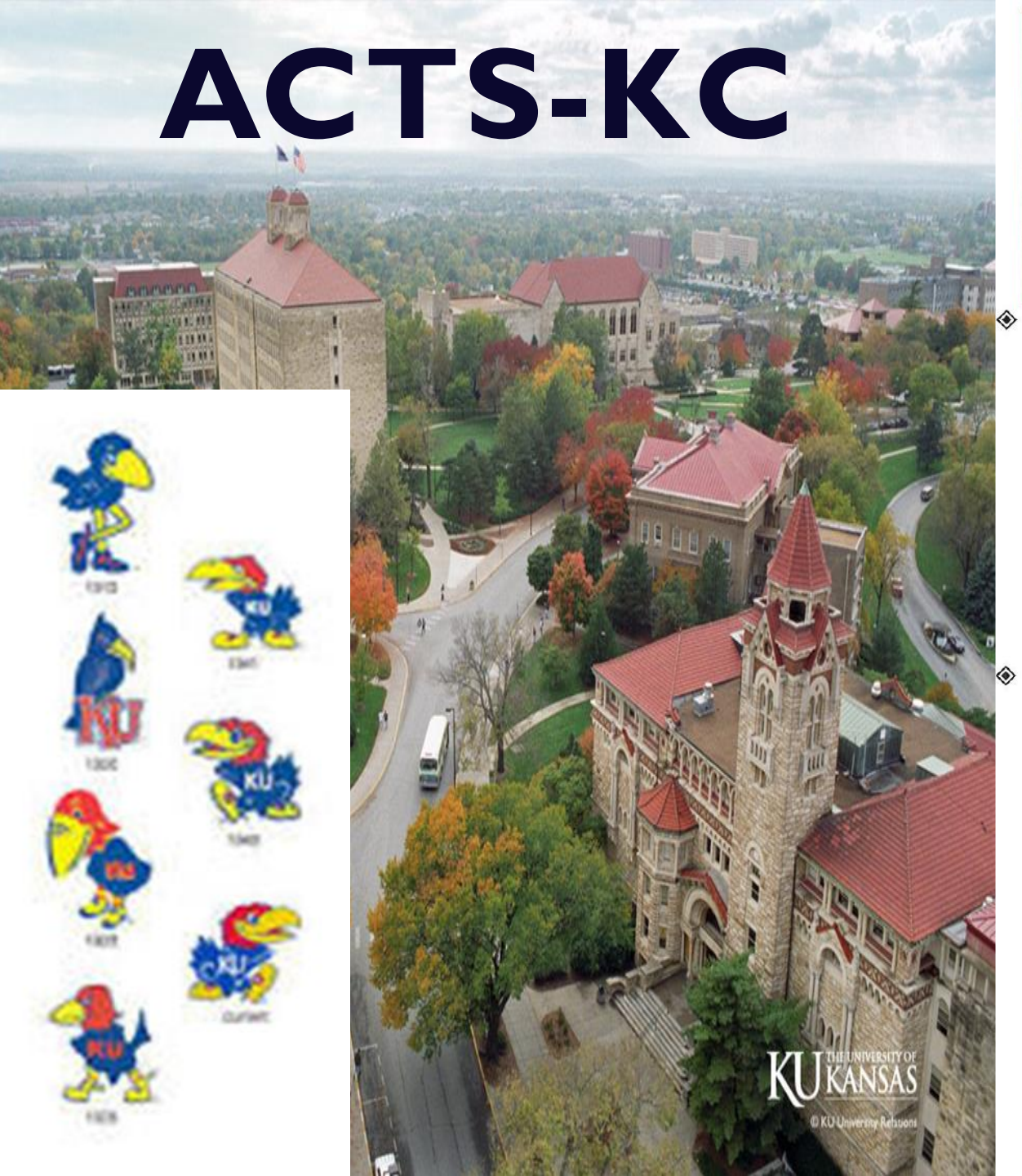
First Experience with AAC







ACTS-KC



ACTS-KC

Augmentative and Alternation Communication in the Schools:
Leadership and Access - Kansas City

- ACTS-KC provides KU speech-language pathology students with a two year collaborative field experience with a student who uses AAC in the general education classroom and his/her general education teacher. Each month students support an AAC user in the general education classroom for 12 hours and spend 3 hours with the student in non-academic settings.
- ACTS-KC offers seven courses related to augmentative and alternative communication that supplement the student's graduate program.
  - Introduction to AAC
  - AAC in the Schools: Assessment and Intervention
  - Clinical Practicum in AAC
  - Seminar in Multicultural Issues: Assessment
  - Seminar in Multicultural Issues: Intervention
  - Seminar: Issues and Research in AAC
  - Technology Laboratory
  - Advocacy and Leadership
  - AAC and Literacy

ACTS-KC is a project for graduate students in speech-language pathology interested in:

- learning strategies for improving communication and education of students using augmentative and alternative communication (AAC) systems in general eduation settings
- collaborating with general education teachers, families, and other important individuals in the students' lives
- learning to provide supports in a manner that is respectful of the unique cultural and economic background of each classroom and family
- Students also have the opportunity to participate in special projects with educators and families.
- As a part of their graduate program, students complete a research project or thesis related to individuals who use AAC.

Project BOLLD:

Bilingual Oral Language and Literacy Development

Past:

- Wood, C., & Hoge, R. (2017). Average change in sentence repetition by Spanish-English speaking children: kindergarten to first grade. International Journal of Bilingual Education and Bilingualism, DOI:10.1080/13670050.2017.1308310

Present:

- Spanish-English dual language developmental trajectory and linguistic interplay for Spanish-English dual language learners (DLLs): A linear growth model for a continuous outcome with time-invariant and time-varying covariates
- The Dimensionality and Criterion Validity of the Sentence Repetition Subtest of the Bilingual English-Spanish Assessment (submitted for ASHA 2017)
- Differential Item Functioning between Spanish monolingual and Spanish-English bilingual children on the Test de Vocabulario en Imagenes Peabody (TVIP)
- Word Study: Morphological Awareness Curriculum Development for English Language Learners (FCRR, REL)

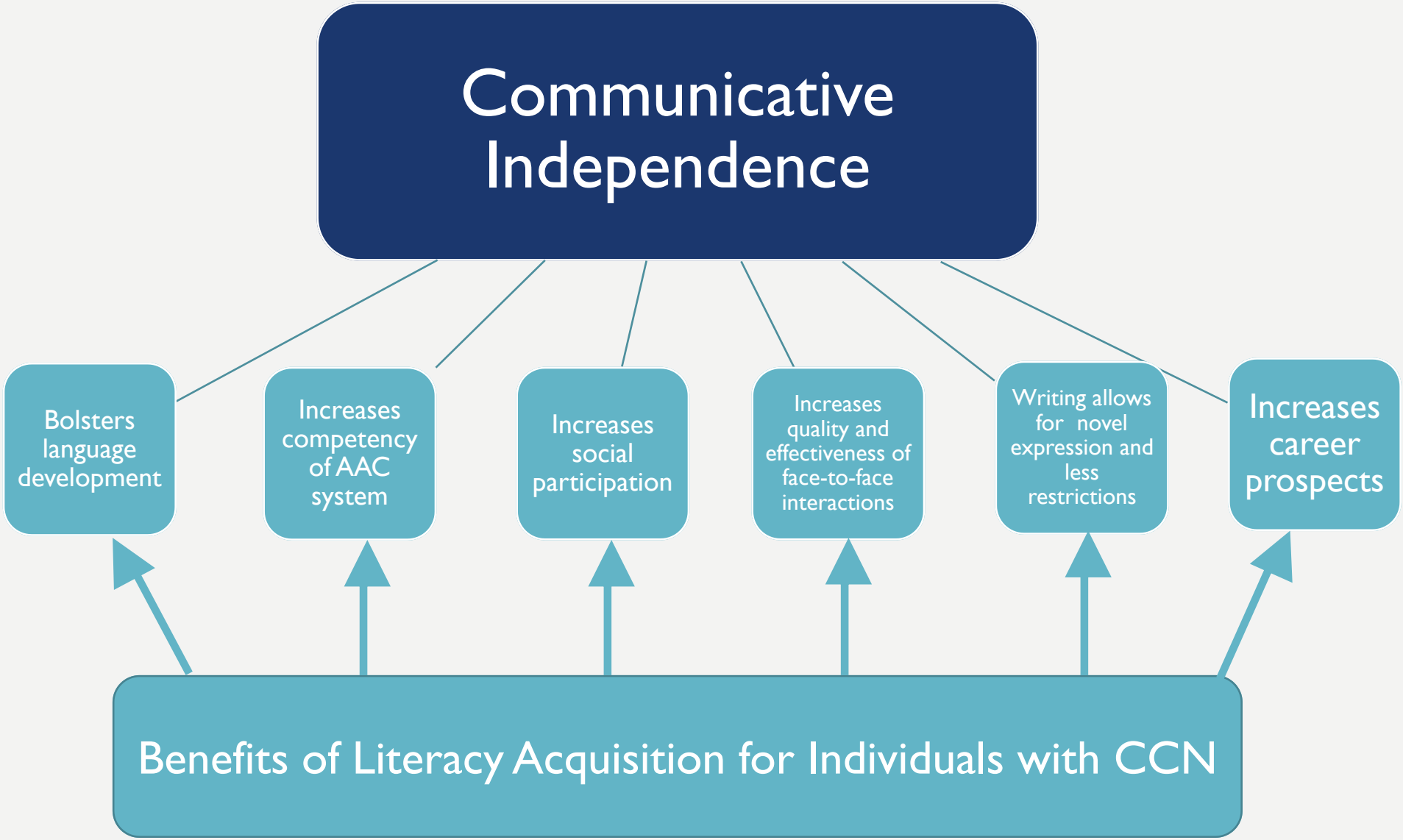
New Idea:

- Multilevel Modeling/Meta-analysis of SCDs in Adapted Word Reading Instruction for Students with CCNs

Literacy Intervention Study

https://www.youtube.com/watch?v=MRZxZsMd5jw

Self-determination is a key outcome of literacy instruction (Ruppar, 2014)



Light & McNaughton (1993); Koppenhaver, Coleman, Kalman, & Yoder (1991); Harrison-Harris (2002)

Literacy Models

Seidenberg & McClelland (1989)

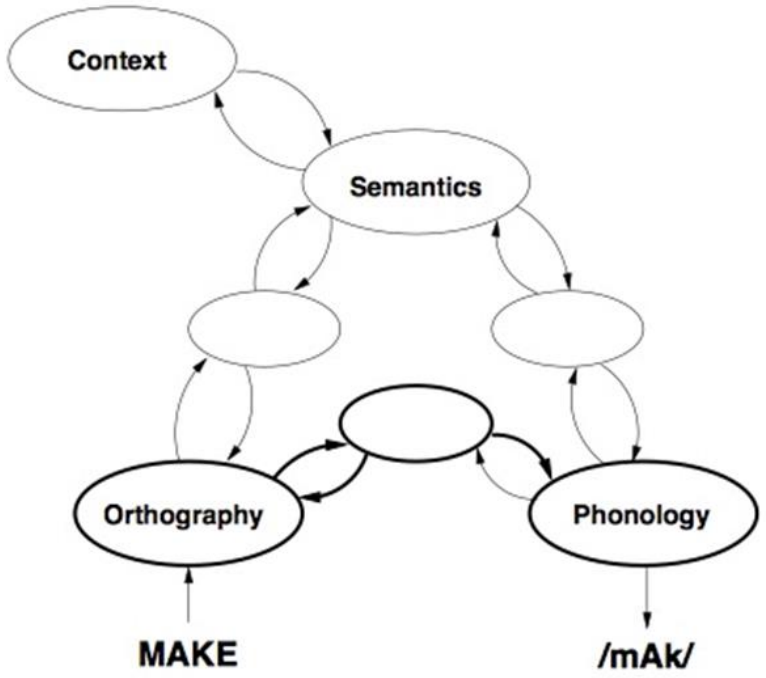
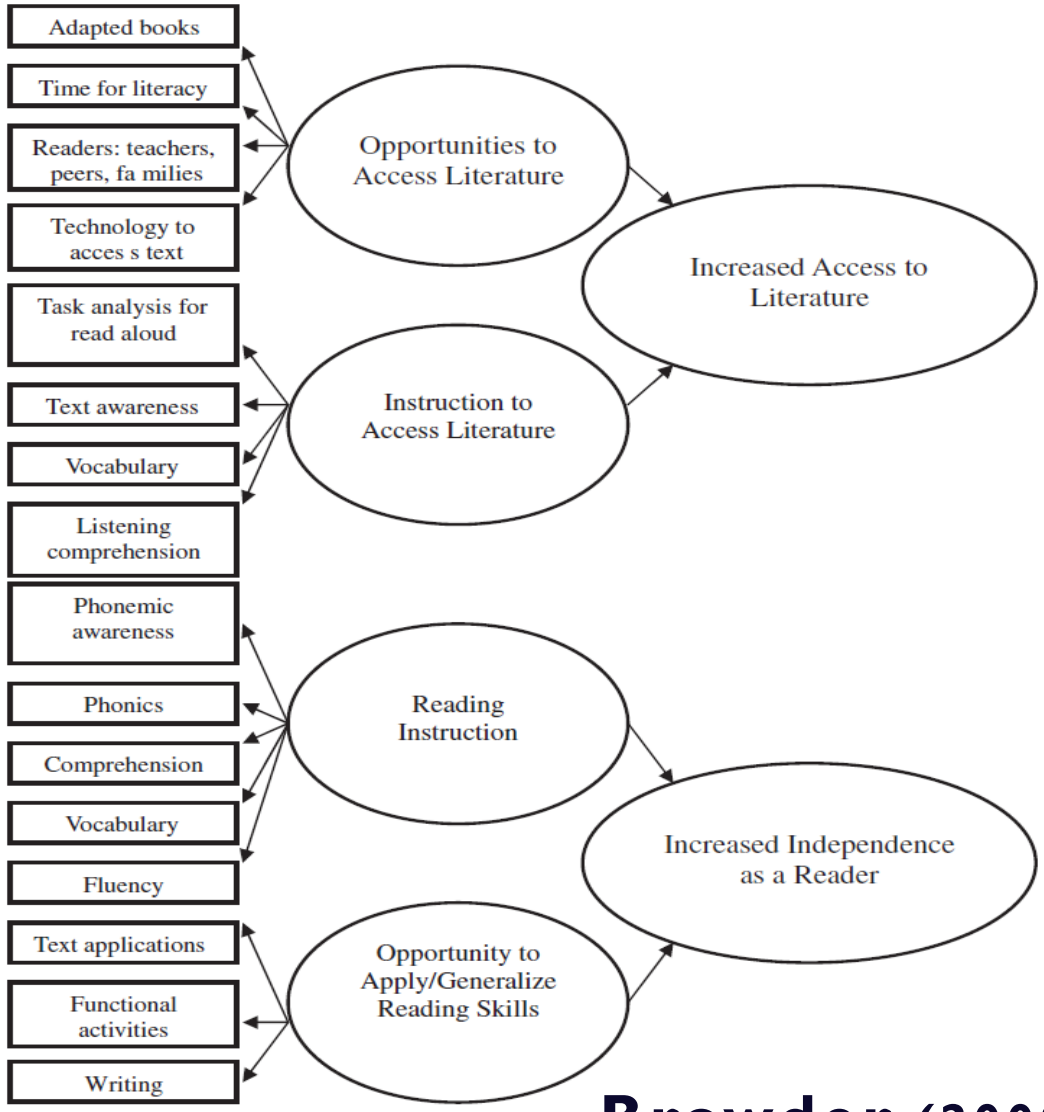


Figure 1. The "triangle" model of Seidenberg and McClelland (1989). The implemented model examined how phonological codes are computed from orthography. The present research examined processes involved in computing semantic codes from orthography, given the availability of both direct (orth→sem) and phonologically-mediated (orth→phon→sem) pathways.

Figure 1
Model of Literacy for Students With Severe Developmental Disabilities



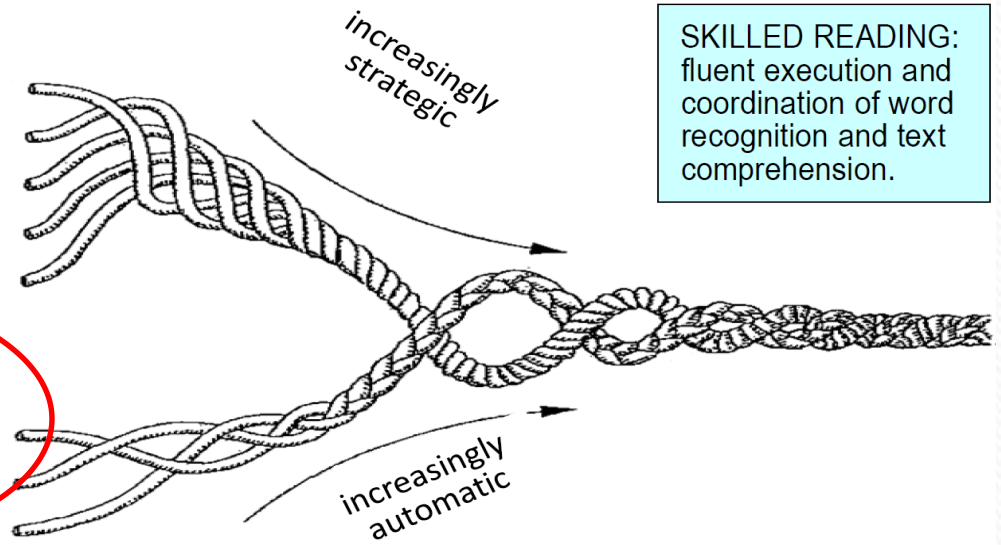
Browder (2009)

Models of Reading

Scarborough's Reading Rope (2001)

LANGUAGE COMPREHENSION

- Background Knowledge
- Vocabulary Knowledge
- Language Structures
- Verbal Reasoning
- Literacy Knowledge



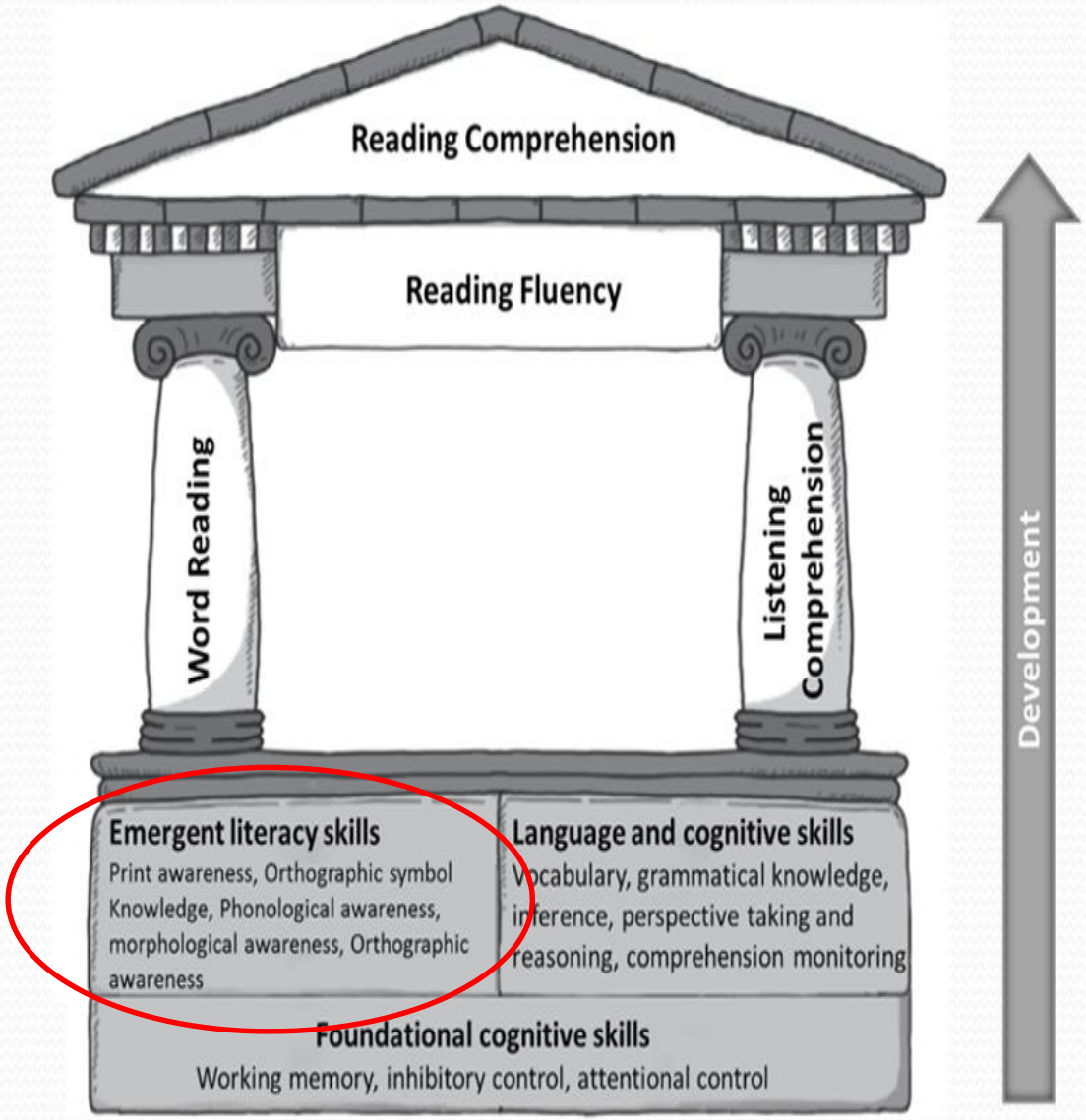
SKILLED READING: fluent execution and coordination of word recognition and text comprehension.

WORD RECOGNITION

- Phonological Awareness
- Decoding (and Spelling)
- Sight Recognition

Reading is a multifaceted skill, gradually acquired over years of instruction and practice.

Component skills of reading comprehension and their structural relations



Kim (2016)

Presentation Agenda/Goals

1

Describe constructs and provide brief overview of theoretically based research need

2

Review of relevant high quality adapted literacy intervention studies for students with CCN

3

Describe elements of proposed research study and associated challenges/concerns questions and seek feedback

4

Seek feedback, brainstorm, and engage in discussion/collaboration to strengthen research design and feasibility of implementation

Future Efficacy/Pilot Study

Research Question:

What is the effect of an adapted Spanish emergent reading intervention for school-age English learners with complex communication needs (CCN) from Spanish-speaking homes?

Key Elements

- **Emergent literacy intervention**
  - *Adapted*
  - *Evidence Based*
  - *Spanish*
- **Students with CCN**
  - *School-age*
  - *English learners (ELs)*
  - *From Spanish-speaking homes*

Emergent Literacy

- Knowledge and skills in domains such as letter knowledge, letter-sound correspondences, print awareness, phonological/phonemic awareness, morphological awareness, orthographic awareness, and familiarity with the basic purposes and mechanisms of reading and language (Snow et al., 1998; Kim 2016).
- Supports later development of skilled reading and literacy attainment
- Can be enhanced through a variety of environmental factors, interactions with adults, and explicit instruction (McDonnell et al, 2014).
- Especially important for students with CCN who use AAC, as research has suggested that the quality of their early literacy experiences differ, which may affect their development of emergent literacy skills (Light & Kent-Walsh, 2003)

National Reading Panel (2000)

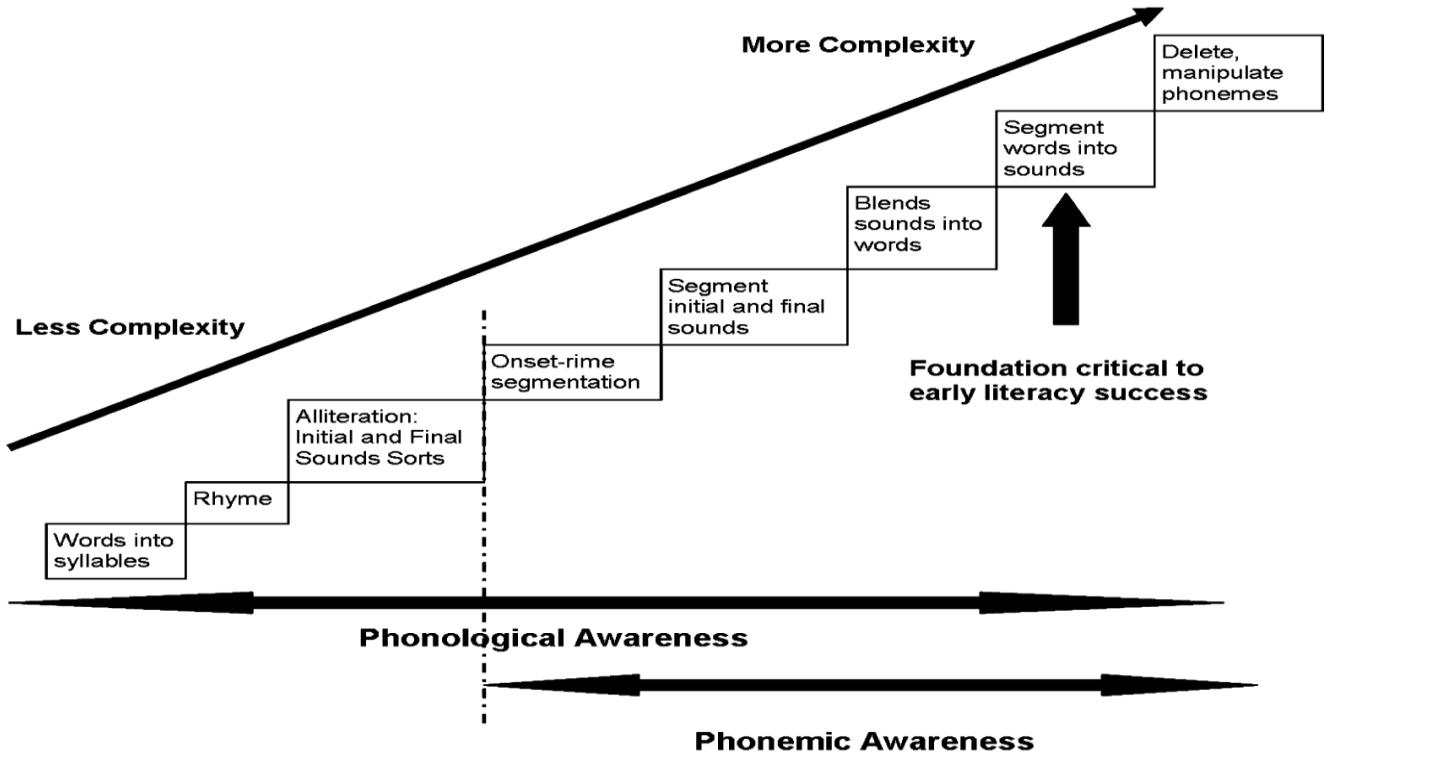
- Phonological awareness and phonics instruction are critical components to effective reading instruction
  - **Phonological awareness**: the ability to notice, think about, and manipulate the sounds in language (Torgesen, 1997)
    - Refers to the understanding that ***spoken*** language can be broken into smaller sound units: sentences, words, syllables, phonemes
    - **Phonemic awareness** refers to the awareness of individual sounds in spoken words.
  - **Phonics:** understanding and using the relationships between sounds and letters to decode unfamiliar words in ***text***

PA can improve with instruction and intervention (most effective before 2nd grade), and gains in PA lead to improvement in word decoding (Ehri et al., 2001; National Institute of Child Health and Human Development [NICHD], 2000a, 2000b; Troia, 1999).

Phonological awareness includes the following skills:

1. Rhyming
2. Phoneme identification
3. Blending
4. Segmentation
5. Manipulation

Figure 1. Sequence of phonological awareness instruction and intervention.



At age:	The average child can:
Beginning kindergarten	Tell whether two words rhyme. Generate a rhyme for a simple word like cat or dot. Or be easily taught to do these tasks.
End of kindergarten	Isolate and pronounce the beginning sound in a word like nose or fudge. Blend the sounds in two-phoneme words like boy or me.
Midway through first grade	Isolate and pronounce all the sounds in two- and three-phoneme words. Blend the sounds in four-phoneme words containing initial consonant blends.
End of first grade	Isolate and pronounce the sounds in four-phoneme words containing initial blends. Blend the sounds in four- and five-phoneme words containing initial and final blends.

Figure 2. Expectations for the development of phonological awareness skills.
✧ Torgesen, J.K. & Mathes, P.G. (1998). "What Every Teacher Should Know About Phonological Awareness." Florida State University, Florida Department of Education.

Table 2. Benchmarks for phonological awareness achievement.

Age/Grade	*Skill or ability*
Preschool	Some rhyming ability (e.g., match rhymes) Some beginning sound ability (e.g., beginning sound sorts) Segment words into syllables
Early kindergarten	Judge and match rhyming words Generate rhyming words
Middle kindergarten	Match words with same beginning sounds Match words with same final sounds Segment initial sounds and final sounds
Late kindergarten	Segment and blend two and three sound words that are consonant-vowel (e.g., go), vowel-consonant (e.g., up), consonant-vowel-consonant (e.g., cat, moon)
Early first grade	Segment and blend sounds in words with consonant blends (e.g., skate, jump)

Figure 2
Model for Emphasis of Literacy Program of Different Age Levels

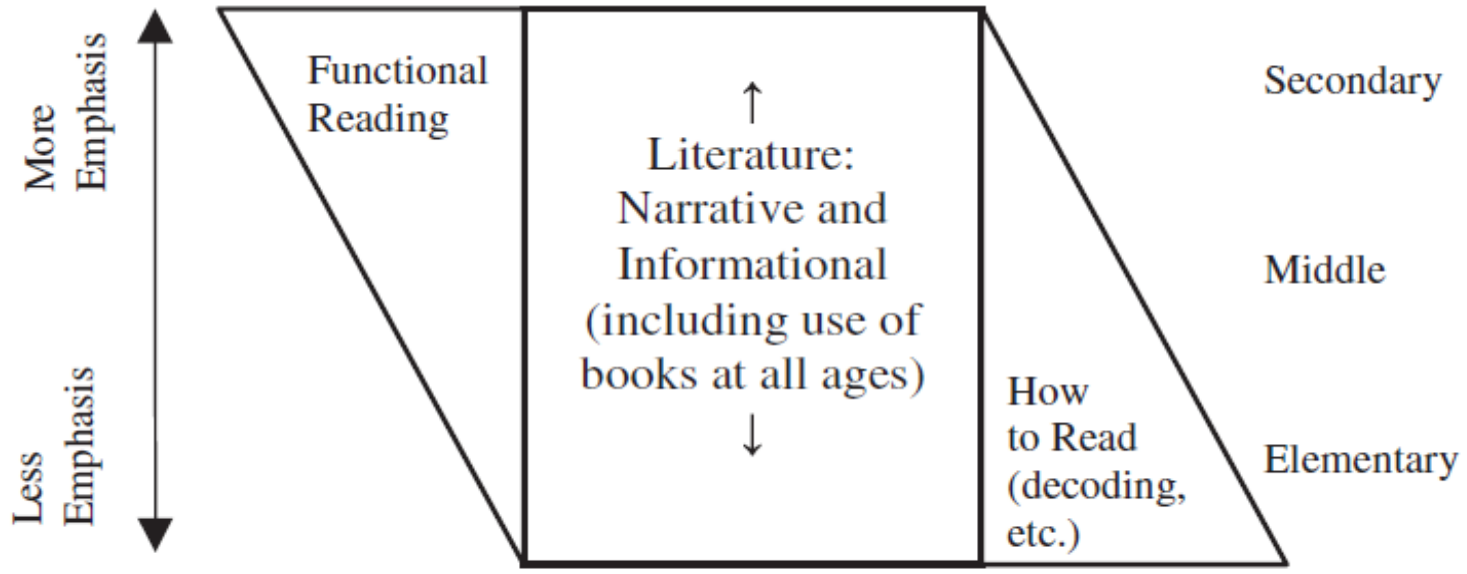
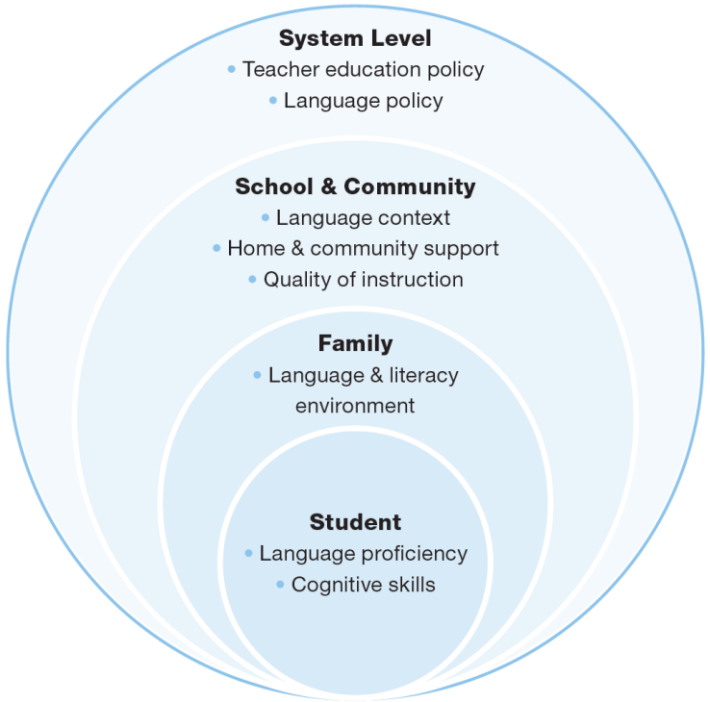


Figure 1. Factors contributing to literacy acquisition



Principles of Effective Intervention

Torgesen, 2004

- Systematic
- Cumulative
- Explicit
- Supportive
- Intensive

Schuele, 2016

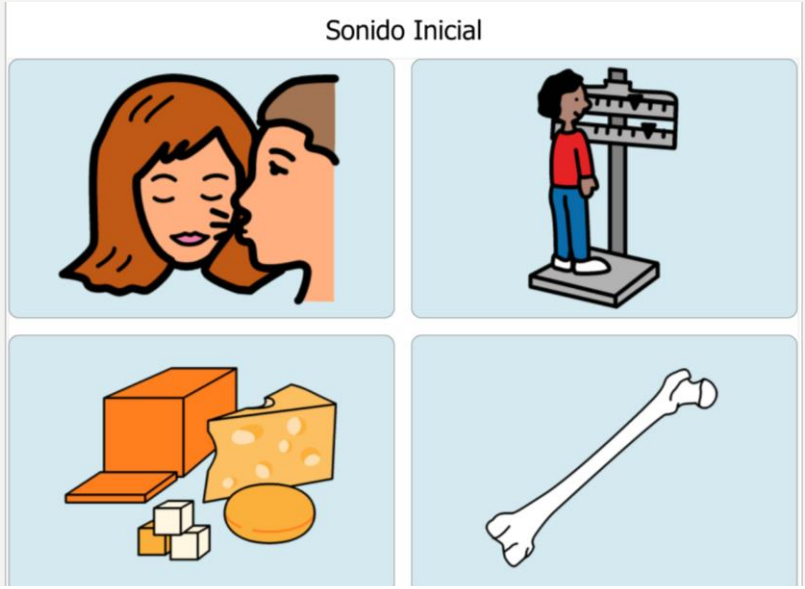
Word reading intervention needs to:

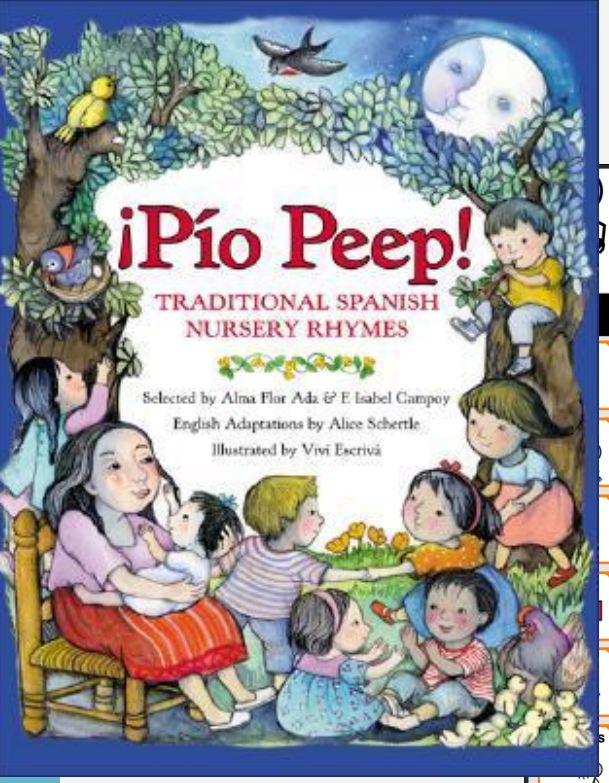
- Be developmentally sequenced
- Be sufficient in scope
- Be sufficient in intensity and duration
- Make explicit links between phonemes and graphemes

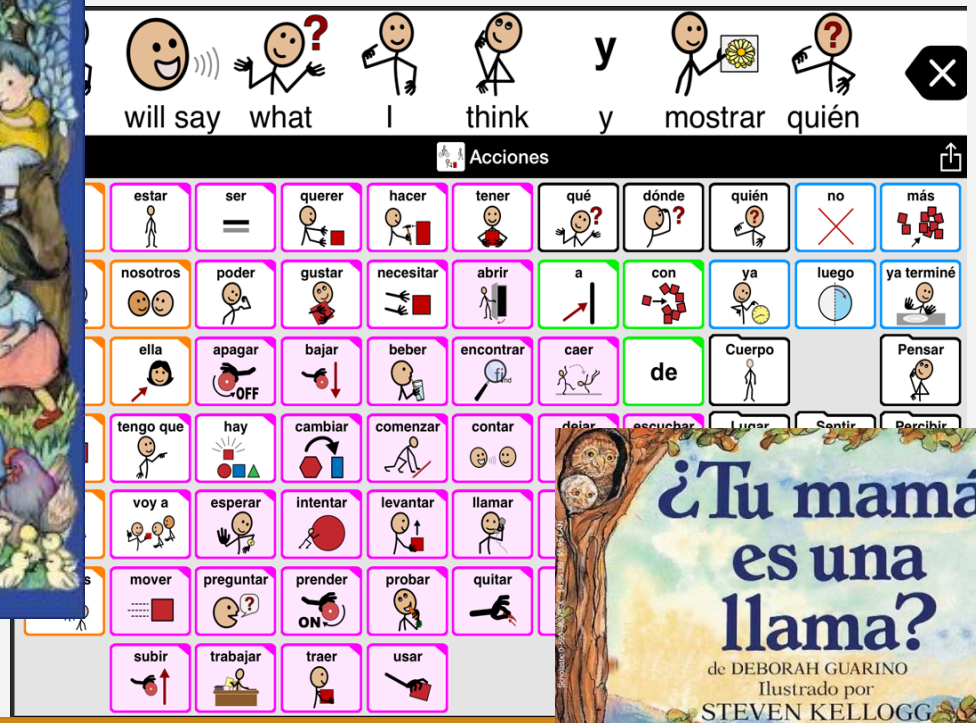
Adapted Instruction

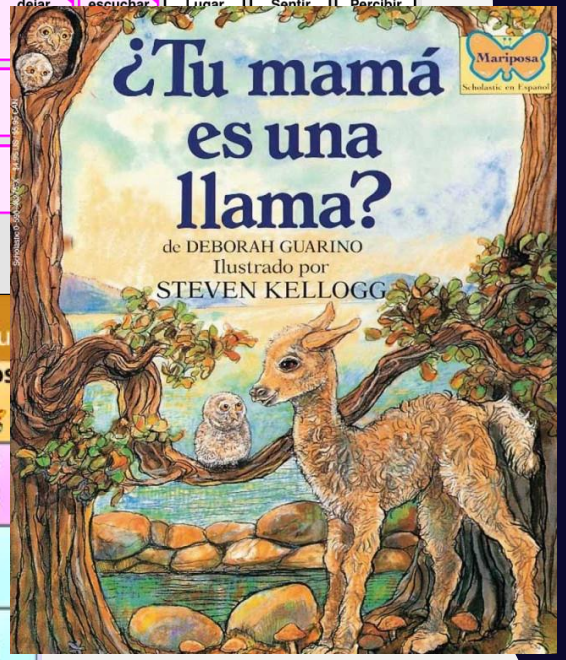
- Adapted presentation by instructor and response mode by learner to meet individual needs of student with CCN
- Student communicates literacy knowledge receptively when presented with response choices (orally and/or visually)

- Example:
  - Initial phoneme segmentation:
    - *Cuál palabra empieza con el sonido /p/: beso, peso, queso, hueso?* (Which words starts with the sound /p/…?)









"Research does not yet exist on whether the applications of effective reading strategies, such as promoting phonemic and text awareness, will lead to independence as a reader for this population. What is important is that students with severe developmental disabilities have the educational opportunity to learn to read in the early grades" (Browder, 2009).

Review of Evidence

Systematic Reviews

- Machalicek et al. (2010)
- Barker, Saunders, & Brady (2012)
- Yorke (2013)---candidacy project specific to word reading interventions
  - All conclusive studies utilized direct instruction or organized instruction

Machalicek et al., (2010)

Fallon et al. (2004)	One male, 11 years old, intellectual disability. one male, 14 years old, intellectual disability. one male, 9 years old, Down syndrome	Improve student's ability to match single sounds to the initial sounds of words, and to telescope sounds onto words. Increase the number of VC[h] and CVC[d] sight words read correctly by student during reading of book	*Direct instruction*: Student presented with four picture symbols, written words and verbal labels. Three pictures were foils and one was the correct response. Student was asked to choose picture of the word that started with the phoneme. For single-word reading, interventionist read word. Student was asked to select correct picture of the read word. Both conditions used modeling, prompting, and corrective feedback	*Results:* Each of the three participants improved in their ability to read single targeted VC[h] and CVC[d] words. (*M* PND[f] = 96% range, 88–100%), but demonstrated less improvement in reading target words in book contexts with two of three participants demonstrating generalization to book contexts (*M* PND[f] = 83% range, 50–100%). However, generalization was not assessed during baseline assessment *Certainty of Evidence*: Conclusive
Millar et al. (2004)	One female, 7 years old, cerebral palsy, cystic fibrosis, congenital amputation of left hand. one female, 10 years old, Cerebral palsy. one male, 10 years old, alternating hemiplegia	Improve child's ability to correctly select the initial letters of orally presented words, and to correctly select letters that correspond to letter sounds	I. *direct instruction*: For letter-sound instruction, interventionist vocalized a letter sound or word, and asked student to select corresponding letter/initial letter on keyboard using MTL[i] prompting II. *Writing workshop*: Student provided four picture prompts. Interventionist read each word and student was asked to write a personal story. Interventionist modeled the selection of initial letters from the picture prompts and created a story by linking words typed by student	*Results:* Two of three participants improved in their ability to select the initial letters of orally presented words (*M* PND[f] = 100%) and to correctly select letters corresponding to letter sounds (*M* PND[f] = 78% range, 50–100%). The same two participants also demonstrated generalization of targeted skills to the identification of initial letters of novel words and one of the two participants was able to select the initial letter of words without the interventionist providing an oral model. However, one participant showed little progress on targeted skills until instruction was adapted and did not meet criterion performance for all targeted letters/sounds *Certainty of Evidence: Conclusive,* for two participants. *Inconclusive,* for one participant due to lack of clinically significant improvement upon introduction of intervention

Machalicek et al., (2010)

Johnston et al. (2009)	One male, 5 years old, cerebral palsy and severe developmental delay	Improve child's ability to correctly identify targeted letters and spell words consisting of CVC[d] combinations	*Direct instruction*: For teaching letter-sound correspondence, teacher delivered scripted instruction. Model-prompt-check prompts with 5 s constant time delay, corrective feedback and access to preferred item contingent on correct responses	*Results:* Student's ability to correctly identify targeted letter and spell CVC[d] words improved following instruction (*M* PND[f] for number of correct identification of letters=98% range, 88–100%; *M* PND[f] for number of correct spelling of CVC[d] combinations=100%) *Certainty of Evidence:* Conclusive
Truxler and O'Keefe (2007)	Four children, ages 8–9 years old, cerebral palsy and intellectual disability	I. Improve child's ability to match spoken letter name or letter sound to the associated picture of the word beginning with that letter. II. Improve child's ability to match spoken syllable or word read aloud to the correct written syllable or word	I. *Direct instruction*: Interventionist read a storybook to student that targeted a single letter/sound. Students answered comprehension questions by pointing to picture symbols. Interventionist reread story and pointed to targeted letter/sound in words. Student asked to find target letter on keyboard II. *Direct instruction*: Interventionist blended letter/sounds into VC syllables and CVC[d] words by elongating and iterating sounds, pointing to cards with written target letters, and sliding the letter cards together as the sounds were blended. Student asked	*Results:* One participant improved her phoeneme awareness, ability to match letter/sounds, but did not improve in her ability to generalize skills to nonwords. The other three participants did not demonstrate criterion level accuracy in targeted skills (*M* PND[f] for percentage of correct responding in Experiment I = 73% range, 18–100%; *M* PND[f] for percentage of correct responding in Experiment II = 61% range, 0–92%) *Certainty of Evidence:* Inconclusive due to, Non-concurrent multiple baseline across participants design

Barker, Saunders, & Brady (2012)

Table I. Article Summary.

Study	Child	Age	Diagnosis	IDD	AAC	Speech Intelligibility	Pre-Intervention Reading	MES?	Effect
Blischak et al. (2004)	Gabe	7;0	SLD	No	Unaided	20–30%	Phoneme-grapheme correspondence > 50%. ID 10 target letters	No	—
	Larry	5;0	SLD	No	SGD	30–35%			
	Jane	6;2	SLD	No	Unaided	20–30%			
Coleman-Martin et al. (2005)	Alice	11;0	CP	No	SGD	Severe speech impairment	Demonstrated grapheme-phoneme correspondence; 1st to 3rd grade reading level	Yes	Strong evidence
	Beth	12;0	Autism	Mod	SGD				
	Carrie	16;0	TBI	Mod	SGD				
Fallon et al. (2004)	Dale	11;9	IDD	Mod	SGD	25%	ID 50% of target letters when named; 100% after pre-training	Yes	Strong evidence
	Sam	14;0	IDD	MM	SGD	20%			
	Tommy	9;11	CP	Mod	Unaided	30%			
	Amy	10;3	CP	No	Unaided	25%			
	Nate	9;5	DS	Mod	SGD	10%			
Hanser & Erickson (2007)	Child 1	13;2	CP	No	SGD	Unable to use speech to meet face-to-face communication needs	ID 37 or more capital and lowercase letters; score 11/13 on concepts of print; high Word ID scores	No	—
	Child 2	13;1	CP	Mild	SGD				
	Child 3	7;2	CP	No	SGD				
Heller et al. (2002)	Al	9;0	HOS	Mild	SGD	Anarthria	Demonstrated grapheme-phoneme correspondence; 1st to 2nd grade Word ID	Yes	Strong evidence
	Betsy	16;0	CP	Mild	SGD	Anarthria			
	Cathy	23;0	CP	Mild	SGD	Severe dysarthria			
Johnston et al. (2009)	Eddie	5;3	CP	Mild	CB	5 words including yes and no	Symbolic knowledge, some print awareness	Yes	Strong evidence
	Mary	4;2	CP	Mild	CB				
Millar et al. (2004)	Melinda	7;0	CP	No	SGD	Less than 50%	ID 70% of letters by name. Each could ID some words by sight	Yes	No evidence
	Haley	10;0	CP	Mod	SGD				
	Gary	10;0	CP	Mod	SGD				
Truxler & O'Keefe (2007)	Child 1	8;0	CP	DNS	CB	1- to 2-word utterances intelligible to familiar listeners	40% or less correct on modified Word ID and Word Attack	Yes	Strong evidence
	Child 2	9;6	CP	DNS	CB				
	Child 3	8;7	CP	DNS	CB				
	Child 4	9;6	CP	DNS	CB				

Note. Age in years;months. SLD, Speech and/or Language disorder; CP, Cerebral Palsy; TBI, Traumatic Brain Injury; IDD, Intellectual and Developmental Disability; DS, Down syndrome; HOS, Holt-Oram syndrome; Mod, Moderate; MM, Mild to Moderate; DNS, Yes, did not specify severity; SGD, Speech-generating device; CB, non-electronic communication board; ID, Identification; MES?, Met minimum evidence standards?

Yorke (2013)

	Direct Instruction	Nonverbal Reading Approach
Introduction	Yes	Yes
Modeled Task	Yes	No
Guided Practice: Produced each phoneme and modeled blending	Yes- All letters visible, tracked with finger	Yes- Covered letters and revealed one at a time. Emphasized "Say it in your head"
Checked for Accuracy	Yes, Immediately	No
Evaluation	Match written word to picture (f=4)	Read written word. Identify a spoken word from 4 choices.

	Direct Instruction Fallon, et al. (2004) & Light et al. (2004)	Organized Instruction Nonverbal Reading Approach Coleman-Martin, et al. (2005), Heller, et al. (2002), Swinehart-Jones & Heller (2009)
Letter-Sound Correspondences	Fallon et al. (2004): 50% required for inclusion. Taught remainder. Light et al. (2004): Taught them.	Required for inclusion.
Initial Phoneme Matching and Blending Skills	Taught via Direct Instruction as part of each intervention session prior to decoding instruction.	Included in decoding instruction only.

Orthographic Depth

Syllable Complexity

Cross-Linguistic Transfer

Spanish PA

"Phonological processing is intrinsic to children's reading acquisition regardless of the orthography" (Hu & Catts, 2009).

Participant criteria

- How does the recruitment process differ in SSCDs?
  - Can you recruit participants first, prior to intervention development?
- Participant requirements:
  - Spanish must be primary language spoken in the home and reported as student's dominant language as assessed by parents with Language background interview/questionnaire
  - Vision/hearing within normal limits (with corrections)
  - Operationalize CCN
    - Speech intelligibility? Measured how?
  - Demonstrate ability to make and clearly indicate choices (e.g., point or eye gaze, etc.)
    - Field of 4?
  - Demonstrate print awareness (ID sentences, words, letters)
    - Measured how?
  - Demonstrate understanding of basic concepts used in instruction (start/end, same/different)
    - Measured how?
  - Preintervention: receptively identify % of picture cards after teaching certain # weeks?
    - Criterion level? Time constraints? Best practices for choosing targets?

Are there any good resources describing best practices or commonly used cutoffs/criterion level for skills and other inclusionary/exclusionary requirements?

Limit participant restrictions

-Do NOT need to demonstrate letter-sound knowledge prior to intervention

-Do NOT need to be current AAC users

-Do NOT need to be educated in a bilingual program

-NO "school-age" limit although ideal grades are Pre-First

-NO restrictions based on type of DD or presence/level of ID, although cognition and other relevant details (e.g, diagnosis) should be measured and reported

Measures of cognition/IQ: Nonverbal intelligence (e.g., PTONI)? Attention? Memory?

Design

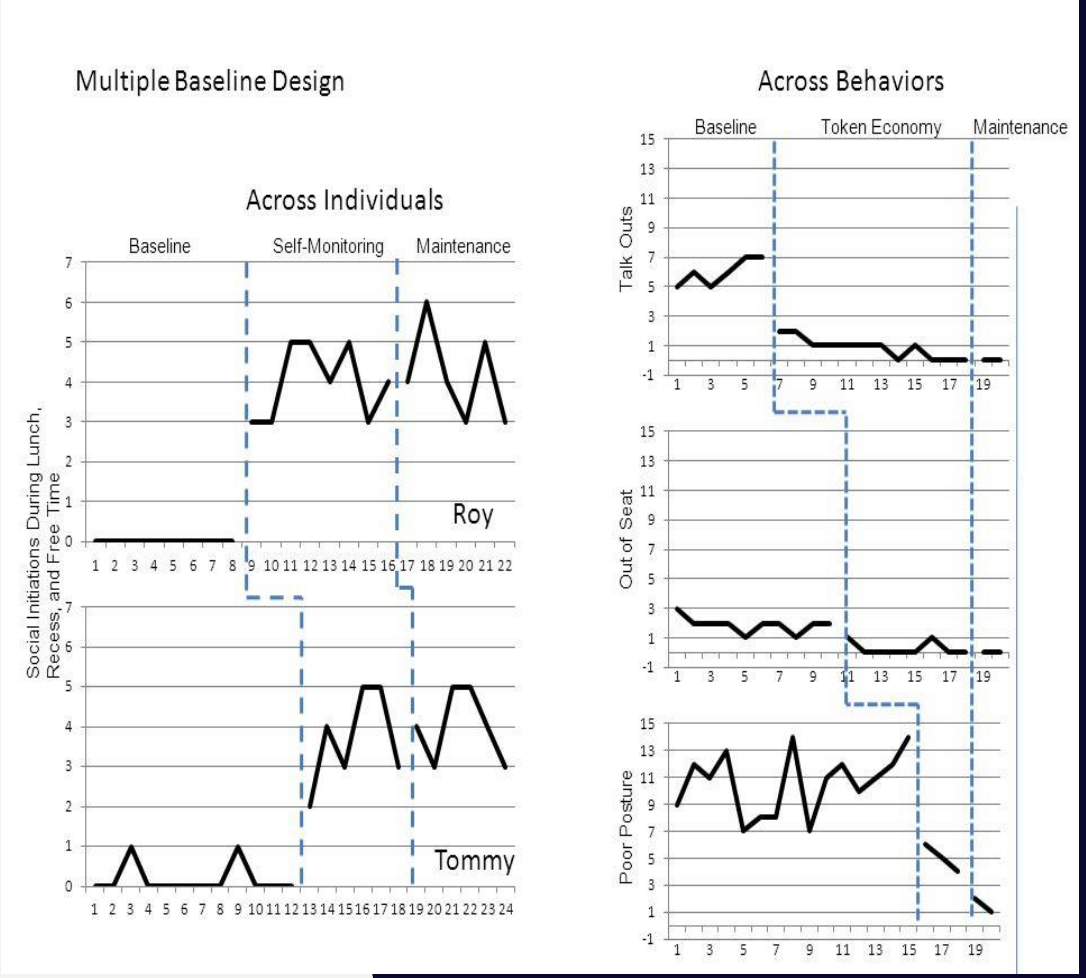
Multiple Baselines

Across Behaviors

-Minimum # of data points

- 3-5?

- Criteria for initiation of intervention?
- Single participant
- 3 or more behaviors?
  - LSC, Rhyming, Segmenting, Blending
    - Syllable or phoneme level?



Concern: Behaviors must be independent, so inclusion of letters/words adds complication

Is multiple baseline across participants preferred?

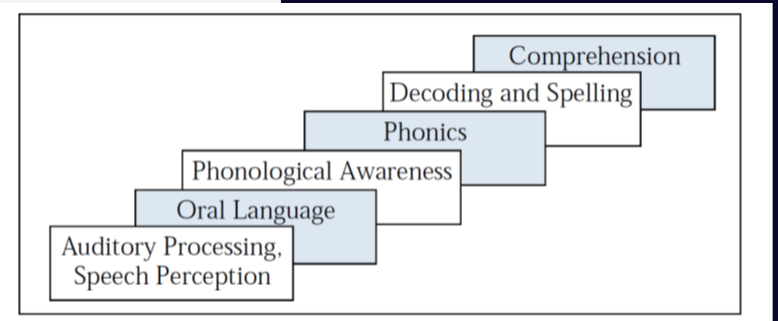


Figure 3. The Language to Literacy model of learning to read.

Considerations for Materials and Measures

- Selection and order/sequence of target Spanish PA skills
- Selection and order/sequence of target letter-sound correspondences
- Intervention "package" or skill at a time?
- Pseudo and/or non-words too?
- Increasing difficulty
  - starting with syllables and moving to phonemes?
  - altering relationship of foils/distractors to targets?
- Characteristics of best symbols/images (realistic, illustrations, getty or google images, PRC, personalized, visual scene)?
- Static grid with field of 4?
- Picture cards and response templates
  - Is there a virtual or online platform that could easily support this intervention?
- Should targets be culturally and dialectically "neutral", region specific, personalized to student?
- Assessment of PA as % accurate?
- Assessment of LSC as % accurate?
- Should a certain level of mastery be required before moving to next skill?

Procedural Considerations

- Administrator training (Script, duration, evidence of passing/completion?)
- Administration criteria:
  - One-on-one instruction
    - Native Spanish-speaking preferred but should it be required in preliminary and pilot research?
    - Researcher/SLP or student clinician? What about parent, teacher, or aide?
- Location (home or school or given preference)?
- Starting point, duration, and dosage/intensity
  - Can it differ by participant?
- What is the standard protocol for halting intervention if no positive effects demonstrated?
- Evidence-based instructional principles and strategies:
  - Introduce, Teach, Model, Active Practice, Evaluation, Guided Practice
- Fidelity of implementation checklist (record 20% sessions?)
- Reliability of scoring (record 20% sessions?)

Literacy

"One writes out of a need to communicate and to commune with others, to denounce that which gives pain and to share that which gives happiness...

One assumes that literature transmits knowledge and affects the behavior and language of those who read, thus helping us to know ourselves better and to save ourselves collectively...

One writes, in reality, for the people whose luck or misfortune one identifies with—the hungry, the sleepless, the rebels, and the wretched of this earth—and the majority of them are illiterate."

-Eduardo Galeano, In Defense of the Word, 1976 (130)

Feedback, Recommendations, Notes

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