Measuring the Acquisition of English Vocabulary in Spanish-speaking Children: The Word Inventory

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Overview of Presentation

☐ Methods to develop the Word Inventory-- an assessment of English vocabulary in English proficient students and English-language learners (ELLs)

☐ Findings related to the validity of the assessment and item difficulty

☐ Findings related to the development of English vocabulary in English proficient students and ELLs

☐ Next steps to further develop the measure

Purpose of the Assessment

- ☐ Assess student knowledge of words that appear frequently in grade-level text

  Most vocabulary assessments do not generalize back to a meaningful corpora

- ☐ Find out what attributes of words make them difficult for students to acquire so teachers can focus on these hard-to-acquire words: polysemy, cognate status, conceptual complexity

- ☐ Examine differences between English proficient students and English-language learners (ELLs) in word knowledge as well as in the attributes of words that make word learning difficult

Development of Word Inventory: Defining the Corpus

☐ Draws from Zeno (1995)

- ■ Comprehensive and recent list of the frequencies of words in written text.

- ■ Established the U function of 150,000 words from a corpus of 17.25 million words that came from texts used in educating K through college students.

- ■ U function indicates the number of times a word appears per one million words of written discourse.

Development of Word Inventory: Defining the Corpus

- Based on work by Hiebert
  - □ Incorporate words from Zeno with U functions of 10 appearances or more per million at a given grade level.
  - □ Words with U values in this range accounted for 92% of the unique words on 4th grade NAEP and three of four state standards- based tests, and 90% of words students encounter in text.
- We created two groups of words:
  - □ Those with U functions of 10 appearances or more at grade 1 or 2 or 3, but not 4, 5, or 6
  - □ Those with U functions of 10 appearances or more at grades 4, or 5 or 6, but not at 1 or 2 or 3

Development of Word Inventory: Defining the Corpus

- Eliminated
  - ☐ U value 1,000 or greater
  - ☐ Proper nouns
  - ☐ Numerals
  - ☐ Archaic words and contractions
  - ☐ Kept members of the word family that were derived
  - ☐ Deleted members of the word family that were inflected
- Selected as the 'anchor' the word in a word family with the lowest U, with the assumption that if children knew this word they were likely to know inflected forms of the family
- Assigned meanings for grades 1-3 word forms based on LWV level 4
- For grades 4-6, assigned LWV meanings for grades 4 and 6

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Development of Word Inventory: Rating Cognate Status and Polysemy

☐ Cognate status
- Cognates are defined as words that have similar meanings and look and/or sound alike (Nash, 1997).
- Two balanced bilinguals coded words for cognate status
- Where differences existed a third rater became involved and consensus used to resolve differences

☐ Level of polysemy
- To calculate level of polysemy, definitions counted for each word based on the form of the word
- Not confined to forms that children might be likely to know
- Definitions taken from WordWeb Lexical Database 5 (based on Princeton's WordNet Lexical Database 3.0).

Development of Word Inventory: Coding for Conceptual Complexity

- Research identifies conceptual complexity as an important determinant of word difficulty

- Previous efforts to reliably code for conceptual complexity have not been successful.

- Operationalized the construct: concreteness, imageability, and non-relatedness

- 20 experts coded 40 words for these attributes

- Revised coding rubrics

- 5 experts coded all 104 words

Development of Word Inventory: Rating Conceptual Complexity

Definition: Concreteness

☐ A word is concrete if its referent can be easily perceived through the senses. How easily can you feel (through touch, not through emotions), smell, see, hear, or taste a referent of the word?

☐ Examples of words that might be rated 1 (concrete): *eggs*, *throne*, *pencil*, *run*

☐ Examples of words that might be rated as 3: *expensive*, *peered*

☐ Examples of words that might be rated 5 (abstract): *era*, *indeed*

Aids

☐ When the words are put in context, they might receive a rating of 1 (concrete) if the referent itself can be easily perceived without the aid of a context (e.g., *eggs* on a table).

☐ They might receive a rating of 3 if they can be perceived within a context (e.g., *expensive* diamond ring).

☐ They might receive a rating of 5 (abstract) if even in a context, they cannot easily be perceived (e.g., *Indeed*, I like mushrooms).

Development of Word Inventory: Rating Conceptual Complexity

Definition: Imageability

- ☐ A word is imageable if you can easily form a mental image of a referent of the word. If you close your eyes, how easily can you picture it in your mind?
- ☐ Examples of words that might be rated 1 (imageable): *microscope*, *rain*
- ☐ Examples of words that might be rated 3: *pressure*, *prevent*
- ☐ Examples of words that might be rated 5 (not imageable): *theory*, *merely*

Aids

- ☐ When the words are put in context, they might receive a rating of 1 (imageable) if they can be easily imaged without the aid of a context (e.g. *microscope* on a table).
- ☐ They might receive a rating of 3 if they can be imaged within a context (e.g. He fought to *prevent* the fire from spreading).
- ☐ They might receive a rating of 5 (not imageable) if even in a context, they cannot be easily imaged (e.g. the *theory* that undergirds the economic plan).

Development of Word Inventory: Rating Conceptual Complexity

Definition: Non-relatedness

☐ Non-relatedness is the degree to which an understanding of the word does not require an understanding of related concepts. (For words that are related, the system of related meanings becomes the unit of instruction rather than an individual word.)

☐ Examples of words that might be rated 1 (not related): *lions, banana*, *dog*

☐ Examples of words that might be rated 3: *expensive, awkward*

☐ Examples of words that might be rated 5 (related): *economy*, *calorie*

Aids

☐ They might receive a rating of 1 (not related) if there is no need to explain the target word.

☐ They might receive a rating of 3 if, in explaining, you need to use other words/concepts that are likely to be known by the listener.

☐ They might receive a rating of 5 (related) if, in explaining, you will probably need to also teach other concepts that are not likely known. For example, understanding the word *economy* requires an understanding of the related concepts—production, exchange, distribution, and consumption of goods and services.

Reliability and Validity of the Coding Framework for Conceptual Complexity

- Inter-rater reliability using Kendall's coefficient of stability was .75

- Item difficulty and percent correct were used for predictive validity evidence of the rating method

  - Correlations of around .34 with item difficulty (how well students did on the item as it appeared on the Word Inventory) and .36 with LWV grade level. These are medium level effect sizes and better than previous efforts to rate for this construct

Development of Word Inventory: The Assessment

- ☐ 104 words sampled from our database
  - ■ If word sampled with more than one meaning, sampled again to select one meaning
- ☐ Definitions and sentences from Wordsmyth Lexical Dictionary
- ☐ All items were modified to ensure that they were no higher than a third-grade lexile level.
- ☐ 8 subtests
- ☐ 13 items in each subtest
- ☐ 15 minutes for each subtest

Development of Word Inventory:
The Assessment

Academic Word Inventory—Teacher Version

Practice:
- Before you start, we are going to practice a few items together.
- Look at the first item, then look at the word bank, and tell me which word you think belongs? [Make sure students select the correct answer.] Now let's look at the second item and do the same thing. Which word belongs?
- Are there any questions before you begin?

Word Bank (for practice set)		
belong	divide	Provide
complete	name	remember

A. Something that is [complete] is finished. *Example: I must [complete] my homework before I can watch TV.*

B. A [name] is what someone or something is called. *Example: Her [name] is Maria.*

WORD BANK

abandon	connect	delicate	factor	judgment	review
block	contrast	despite	independent	Maintain	specific
concept	contribute	distribute	infer	refuse	stable
conclusion	convince	establish	internal	region	sustain

1. If something is [internal], it is inside something or someone. *Example: The house has an [internal] patio. .*

2. To [sustain] means to keep something going. *Example: I ate a big breakfast to [sustain] myself during the long run.*

3. A [concept] is a general understanding about something. *Example: He understands the [concept] of multiplication.*

4. To [block] means to stop something from happening. *Example: I tried to walk home from school on the path but a fallen tree [block(ed)] the path.*

5. To [contrast] means to identify the differences between things. *Example: I can tell the twins apart when I [contrast] their different hairstyles.*

6. A [region] is a part of a country. *Example: I live in the southern [region] of the country.*

Findings Related to the Reliability and Validity of the Word Inventory

☐ Reliability, in the form of internal consistency, and validity relative to the standardized Gates-MacGinitie word knowledge test

- The internal consistency of the vocabulary instrument was .98

- The validity coefficient with the Gates-MacGinitie word knowledge subtest was .82

Research Questions Related to Vocabulary Knowledge of ELLs and English Proficient Students

☐ 1. How do third grade Spanish-speaking English-language learners compare to their English proficient (EO) peers in their knowledge of a representative sample of words that occur most frequently in written texts?

☐ 2. Does word difficulty (defined as the percent of students who correctly define the word on the Word Inventory) vary as a function of word attributes such as part of speech and word type (e.g. cognate status, polysemy, and conceptual complexity) ?

Research Questions Related to Vocabulary Knowledge of ELLs and English Proficient Students

☐ 3. Does the function that relates word difficulty to word characteristics vary for English-language learners compared with English proficient students?

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Study Sample

- 153 Spanish-speaking third grade ELLs
  - 126 from HISD
  - 27 from DC
- 181 third grade English proficient students
  - 159 from HISD
  - 22 from DC
- In Houston, classrooms were either all ELL or all English proficient while in DC classrooms were a mix ELL and English proficient students
- All high poverty schools

Study Measures

- ☐ The Gates-MacGinitie word decoding and word knowledge subtests
  - ■ Word decoding served to ensure that students could read the vocabulary items
  - ■ Word knowledge was used to validate the researcher-developed measures
- ☐ Researcher-developed measures
  - ■ Word Inventory: Eight 13 item vocabulary matching tests
- ☐ Demographic data collected from teachers and the district

Study Analysis Plan

- ☐ Group differences on tests
  - ■ Between and within groups t-tests (controlling for family-wise error rates)
- ☐ Item analysis (by ELL/English proficient status)
  - ■ Outcomes analyzed as IRT difficulty parameters
  - ■ Relations between outcomes and predictors examined both as bivariate relations and in a full GLM model
  - ■ Predictors included: form number, item number, LWV grade level, a composite of conceptual complexity (concreteness, imageability, and nonrelatedness), cognate status, polysemy, and number of letters.

Study Descriptive Statistics:
Gates MacGinitie (end of grade 3)

- Word Decoding
  - Average grade level equivalent of 2.7
  - English proficient students: 3.3
  - English-language learners: 2.2

- Word Knowledge (vocabulary)
  - Average grade level equivalent of 2.6
  - English proficient students: 3.5
  - English-language learners: 1.9

Study Descriptive Statistics: Word Inventory

☐ Word Inventory

- Sample average: 52%

- English proficient students: 64%

- English-language learners: 42%

Group Differences on All Tests

- **Between group differences**
  - English proficient students differed from ELLs on all assessments
  - English proficient students also outperformed ELLs on specific types of items in the Word inventory
- **Within group differences**
  - ELLs performed better on cognates than on noncognates
  - English proficient students performed comparably on cognates and noncognates

Relationship between Content Word Characteristics and Word Inventory Item Difficulty

☐ Item analysis: Words that were most challenging for all students

- ◾ Conceptually complex (IRT difficulty: r= .37 for English proficient, .34 for ELL)

- ◾ Living Word Vocabulary levels of grade 5 and 6 (IRT diff: r= .46 for English proficient, .42 for ELL)

- ◾ Some evidence that number of letters predicted difficulty for English Proficient students

- ◾ Some evidence that cognate status is uniquely predictive for ELLs

Conclusions

☐ Possible to create a valid and reliable assessment of vocabulary knowledge for words that appear frequently in grade level texts

☐ Possible to code words on attributes determinant of word difficulty

☐ Same word attributes predict difficulty for both ELLs and English proficient students

   ■ Conceptual complexity and words acquired later (LWV levels of 5 and 6)

☐ ELLs do better on words that are cognates but not the case for English proficient students

☐ ELLs have lower levels of vocabulary knowledge

Next Steps

- ☐ Create an assessment of word knowledge for words that appear frequently in grade-level text with a different form for each grade level, grades k-8
- ☐ Develop interventions to teach words that appear frequently in grade-level text
  - ■ Ascertain which words types need more robust instruction