

# Research In The Workplace: How Practitioners Can Become Researchers

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# Is Research in the Workplace Possible?

## ■ YES!

- Why isn't it occurring more frequently?
  - It often requires partnerships between FT clinicians and researchers
  - Clinicians and researchers may assume clinicians can't or shouldn't be conducting research
  - Time!

# Is Research in the Workplace Valuable?

## ■ YES!

### ■ Look to the EBP call

- Part of the evidence-based practice process is determining feasibility
  - Does this clinical activity show promise for further efficacy research?
- Part of the evidence based practice process is determining effectiveness
  - Can this efficacious clinical practice be replicated in real-world clinical situations?

# Purpose of Presentation

- Present three scenarios and protocols as examples for school-based practitioners who wish to conduct research

# General Format of Scenarios

- Discussion of:
  - steps or background for asking a question
  - a specific testable research question
  - a plan for setting up a research project
  - a list of possible roadblocks
  - how the data may be analyzed
  - ideas for disseminating results

# The Effects of a Multiple Linguistic Factor Intervention on Reading, Writing, and Spelling

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# Players

- Clinical Scientist: Toni Golden
  - Speech-Language Pathologist, Panama City, Florida
  - Caseload of 62-90; 35-49% LI; good working relationship with teachers
- Research Scientist: Kenn Apel
  - The Florida State University, Tallahassee, FL (2 hours east of Panama City)
  - Typical professorial duties (teaching, research, doctoral student mentoring, service)

# Motivation:

- Toni:
  - Read Apel & Singer in ASHA Leader
  - Enjoys working on reading and writing
  - Had presented at FLSHA and ASHA
  - Wanted to get more involved in research
- Kenn:
  - Enjoys learning more about reading and writing, including interventions
  - Loves collaborative research
  - Wants to promote idea of joint projects between clinical and research scientists

# Asking the Question

## ■ Steps

1. Contact made (Sept. '05)
2. Background covered (Toni's work setting/caseload, her interests) (Oct. '05)
3. Both agreed to work together (Nov. '05)
4. Developed idea for study (Nov. '05)
  - a. Toni had a number of students struggling with reading and writing (spelling)
  - b. Kenn suggested an intervention program (SPELL-Links to Reading and Writing) that was used in two case studies

# Asking the Question

## ■ Steps

4. Developed idea for study (Nov. '05)
  - Toni had a number of students struggling with reading and writing (spelling)
  - Kenn suggested an intervention program (SPELL-Links to Reading and Writing) that was used in two case studies and one classroom study (Apel, & Masterson, 2001; Apel, Masterson, & Hart, 2004; Kelman, & Apel, 2004).
5. Led to asking a question

# A Testable Research Question

- Will a multiple linguistic factor approach to literacy intervention lead to improvements in students' reading, writing, and spelling abilities to a greater level than previous interventions as measured by norm-referenced tests?

# Why Might We Want to Study This?

- Many children continue to be left behind in their literacy abilities
- Basic and clinical research suggest an approach that considers the underlying linguistic factors that support literacy will lead to improvements in skills
- Fulfills one role of the SLP in regard to literacy in children and adolescents: advancing the knowledge base
  - American Speech-Language-Hearing Association. (2000). *Roles and responsibilities of speech-language pathologists with respect to reading and writing in children and adolescents: Guidelines, and technical report*. Rockville, MD: ASHA.

# Research Project Plan

## ■ Toni:

- Had at least 10 third graders who were not making good progress
- Data-collection was consistent
- Could examine growth prior to and after implementation

## ■ Kenn:

- Could provide ideas for dealing with extraneous variables
- Provide support for some materials (SPELL; SPELL-Links; stimuli for writing prompts)
- Could conduct data analyses; review fidelity checks

# Continuing History

- Total of one year from initiation of topic to start of project.
- After topic chosen:
  1. Kenn began writing IRB; Toni read a few key articles and got SPELL and SPELL-Links (Nov. '05-March, '06)
  2. Toni and Kenn identify potential participants (exclusionary criteria) for the following academic year and work out method issues (e.g., video recording for fidelity checks) (March-April, '06)

# Continuing History

3. Kenn visits Toni; learns more about program; goes over SPELL-Links (April '06)
4. IRB approved (May '06)
5. Consent forms given to potential participants (Aug '06)
6. Study initiated (Sept. '06)
7. Results presented (ASHA '07?)

# Data Collection

- Pre- and post-testing
- Documentation of lessons taught
- Documentation of time spent on lessons
- Documentation of other services provided (supplemental reading instruction)
- Videotaping for treatment fidelity

# Possible Roadblocks

- IRB School District Permission
  - Length of time
- Caseload size
  - Is it feasible to do this and maintain other cases?
    - Toni's caseload increased to 90!
- Partners' background
  - Toni: research; Kenn: specific demands of Toni's school/caseload
- Distance/communication issues

# Data Analysis

- Examine pre-post test scores on:
  - WMRT-R
  - TWS-4
  - Writing Samples
- Comparisons across years
- Implementation issues
  - Ease
  - Logistics

# Dissemination of Results

Initially, next year in Boston  
(hopefully)!

# Research for the School-Based Practitioner

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# Collaboration

- Jenny Lange, B.A.
  - Graduate student independent study
- Lauren Burrows
  - Undergraduate honor's project

# Begin with a Clinical Idea/Question

- parents provide valid indication of their children's language skills
  - early vocabulary (e.g., Rescorla, 1990; *Language Development Survey*)
  - grammar (e.g., Fenson et al., 1993; *The MacArthur Communicative Development Inventories*)

# Form Initial Question

- Do parents provide valid indication of their bilingual children's phonological skills?

# Why is this Study Important?

- furthers the knowledge base; novel
- no standardized tests for examining phonology in bilingual children
- Bilingual children are at risk for over- and under-diagnosis
- parents know their children and know when to be concerned
- best practice (and part of IDEA) to include parents in the assessment/treatment process

# Search for Literature Using:

- PubMed
  - <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>
  - free database sponsored by the National Library of Medicine (NLM)
- Other Databases
  - EBSCOhost and Ovid for:
    - ERIC, CINAHL, Health Source: Nursing/Academic Edition, Language and Language Behavior Abstracts (LLBA), MEDLINE, and PsycINFO
- Google Scholar
- ASHA's full text journals
  - <http://journals.asha.org/>

# Search for Literature

- studies specific to bilingual children
  - none specifically on point
  - many cross-linguistic (e.g., Jackson-Maldonado, Thal, Fenson, Marchman, Newton, & Conboy, 2003. MacArthur Inventarios del Desarrollo de Habilidades Comunicativas)
  - some related (e.g., Gutierrez-Clellen & Kreiter, 2005; Peña, Bedore, & Rappazzo, 2003).
- search for any studies related to phonological skills
  - none

# Form the Research Question

- Are there differences in the phonological skills of Spanish-English bilingual children for whom parents are concerned about their speech vs. those for whom parents are not concerned about their children's speech?
- Obtain IRB Authorization/School Permission

# Determine the Method

- Develop the Instrument
  - What questions do we want to ask the parents?
- Identify the number and type of participants
  - 2 groups
    - 15 3-4 year olds with parental concern
    - 15 3-4 year olds with no parental concern
- Match the children
  - age
  - dialect
  - gender
  - type of bilingual

# Method (cont.)

- Gather Background Information
  - language history
  - amount of input/output
  - use
  - proficiency
- Determine Analyses
  - phonetic inventory
  - segmental accuracy
  - phonological patterns
  - etc.
- Reliability

# But wait, there's more Method

- Determine descriptive analyses
  - consonant and vowel accuracy, accuracy by sound class, phonological patterns, etc.
- Determine statistical analyses
  - link to main research question
  - Are there differences in the phonological skills of Spanish-English bilingual children for whom parents are concerned about their speech vs. those for whom parents are not concerned about their children's speech?
- use stats to examine differences between groups
- correlate sociolinguistic variables (e.g., amount of input) with children's phonological skills

# Gather the Data

- Interview parents
- Test children
- Over-sample for matching purposes
  - test 60 to get 30
- Place children in groups
- Match samples
  - Determine significant difference between groups on age, dialect, gender

# Analyze the Data

- Put data in Excel/SPSS format
- Run descriptive stats
- Perform tests of significance
  - effect size

# Interpret the Results

- be sure all participants enter into the analyses
- descriptive stats
  - examine means and standard deviations
- tests of significance/correlation
- answer the research question

# Disseminate the Results

- conferences
- scholarly journals
- SID newsletter

Ask the Next Research Question

# Language for Scientific Literacy: Action-Based Research in the Classroom

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# Developing Scientific Literacy Players

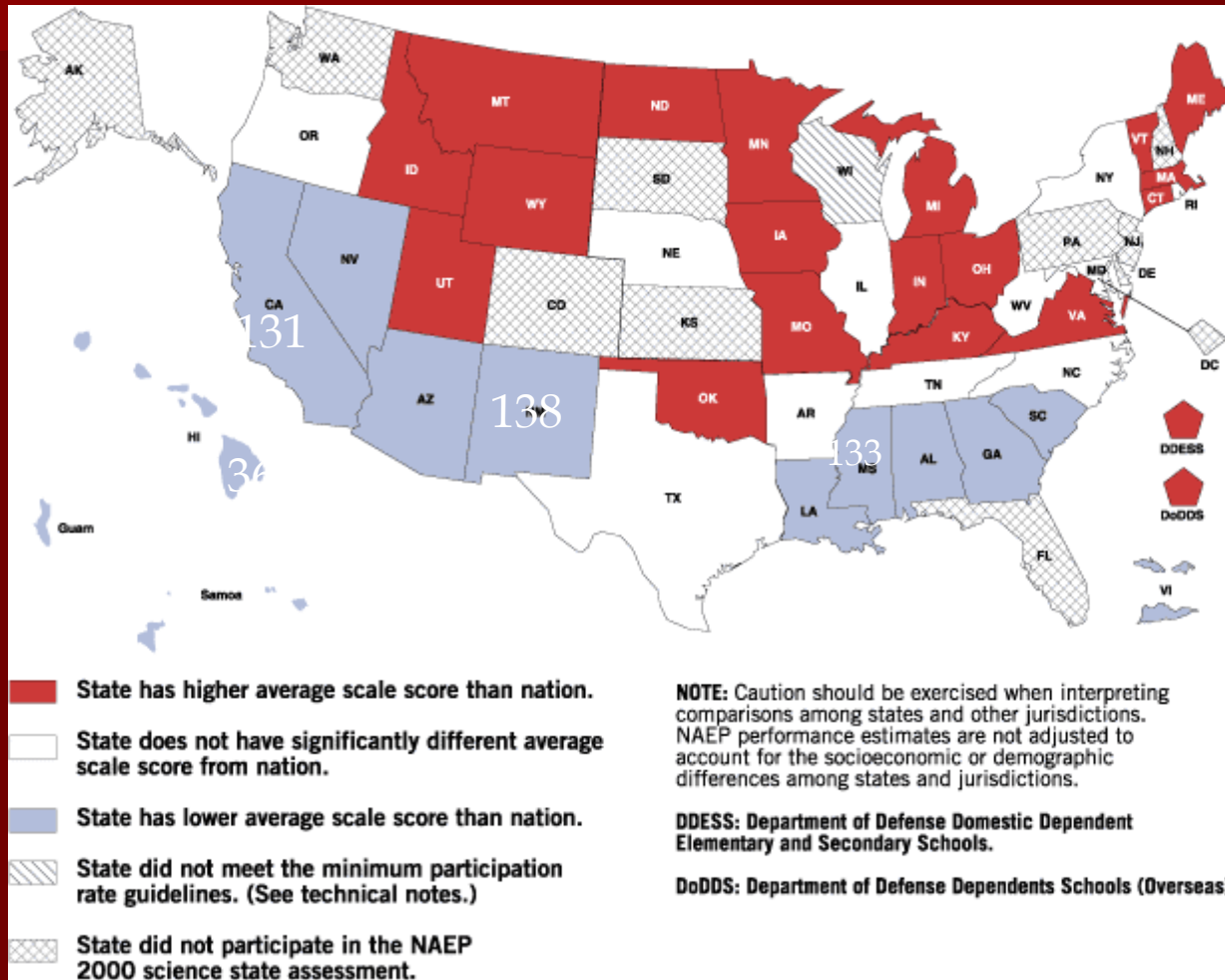
- Location: Elementary school in Albuquerque, NM
  - Nearly all students on free and reduced lunch
  - Student body approximately 90% Hispanic, 10% African American
- Teacher: Kelly Smyer
  - 5<sup>th</sup> grade general education teacher
  - Students from special education class integrated into her science and social studies classes
- School SLP: Mary Ellen Ulibarri
  - Bilingual SLP
  - Provides pull-out services, consultation, and in-class collaboration
- Consultant: Carol Westby
  - Coordinator, Project BRIDGE and Project LEAD, personnel preparation grants for graduate students in Speech-Language Pathology and Special Education

# Motivation

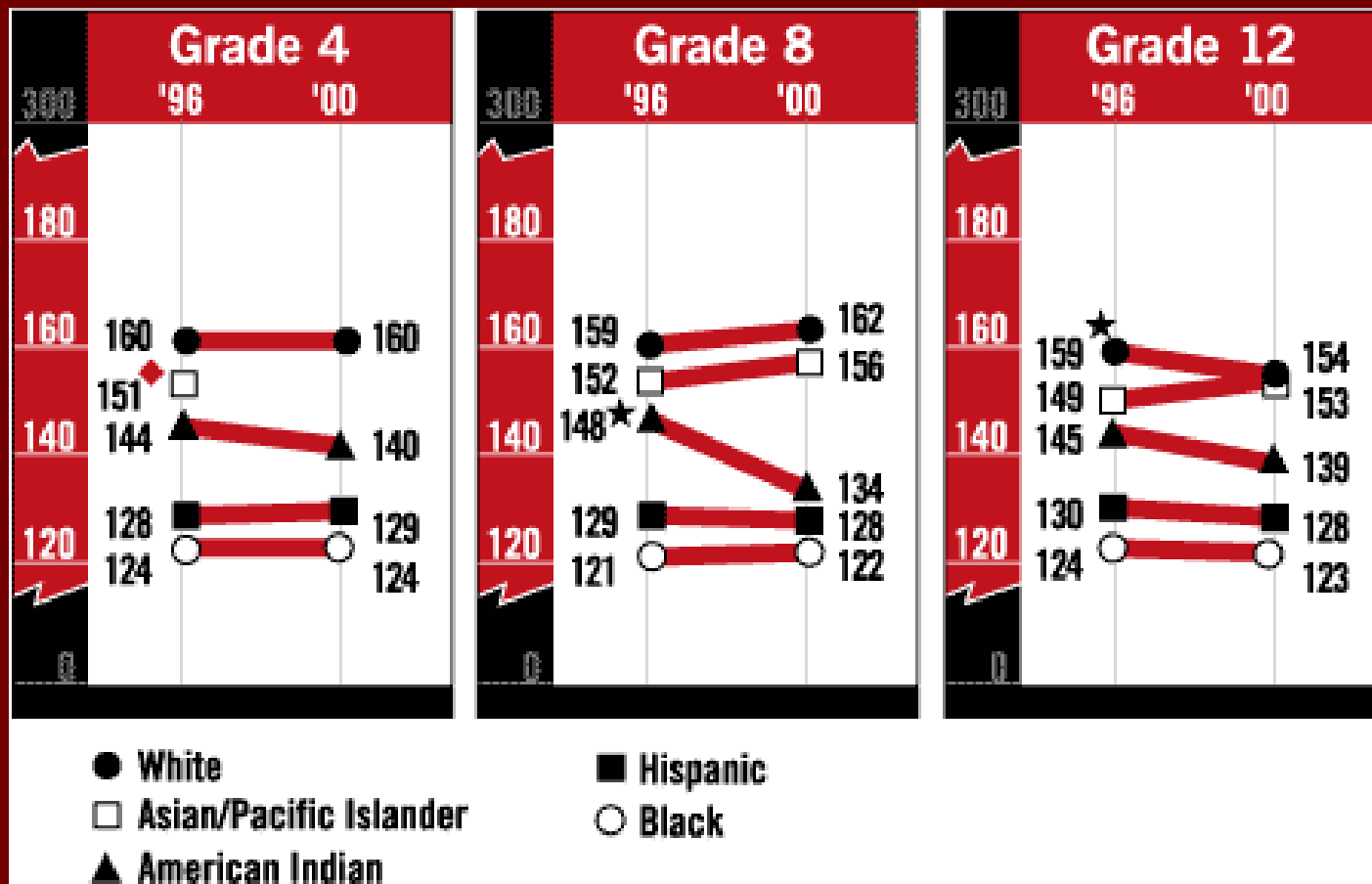
- Carol & Mary Ellen
  - Developed training on Language/literacy assessment for district SLPs
  - For demonstration purposes, evaluated a student with language/literacy difficulties in Kelly's class
- Kelly
  - Carol gave Kelly her chapter, "Beyond Decoding," to explain how she would be evaluating the student
  - Kelly implemented ideas from the chapter in her language arts/social studies teaching
  - Kelly found teaching science more problematic – asked for something to read on the science and language
  - Carol gave her the articles, "Learning to do science: Influences of Culture and Language" and "Developing Scientific Literacy: A Sociocultural Approach"
  - Kelly used information she gained from articles to write a proposal to PNM (NM power company that provides small grants to school personnel to implement new approaches to teaching)

# Justifying the Need for the Project: Why the Concern about Scientific Literacy

## State Performance on 2000 4<sup>th</sup> Grade NAEP Science



# 2000 NAEP Science Results



# Linguistic Characteristics That Make Scientific Discourse Difficult

- High lexical density (many content words/clause)

*Spiders* are not *insects*.//They always *have eight jointed legs*,//not *six* as *insects* have,//and they never *have wings*.// The *feeling organs* on their *head* are not *antennae* but *leg-like structures called palps*.

- High nominalization (a series of events is summarized in one or two terms)

The vapor condenses into droplets of liquid water, forming clouds. If the vapor is chilled enough, it condenses into ice crystals and falls as snow. *This great unending circulation of the earth's waters* is called the *water cycle*.

- Variety of temporal and causal connectives; variety of dependent clauses

- because, so, if, then, when, while, until, unless, before, after

# Characteristics of Scientific Discourse

- Inductive and deductive discourse
  - From particular events to general theory
  - From general theory to particular events
- There was an earthquake because tectonic plates slid.
- Water freezes at 32<sup>o</sup>F. The temperature is 40<sup>o</sup> F, so the ice will melt.
- Multiple genres
  - Descriptive
  - Comparison-contrast
  - Procedural
  - Explanatory (cause-effect)
  - Argumentative (problem-solution)

# Kelly's Objectives for the Project

- Teach students strategies for comprehending nonfiction literature that will provide them with models of vocabulary and language used in talking about science concepts
- Provide students with engaging science explorations that will give them opportunities to use the vocabulary and language patterns modeled in the nonfiction texts.

These objectives will tie the vocabulary, sentence patterns, and text organization (argument structure) taught through nonfiction texts to the 5th Grade New Mexico Science Standards e.g.,

- Science Standard 1.1.11: students will be able to use scientific argument or debate in discussions pertaining to procedures and findings regarding ecosystems.
- Science Standard 2.2.7: students will be able to draw conclusions from scientific experiments and investigations pertaining to weather in a log or journal

# Justification for Funds

- The school science kits are insufficient for teaching science because
  - They do not provide multiple experiences necessary for students to learn the concepts
  - They do not provide students with models of the language that must be used to explain the concepts.
- To address these deficits in the available program, we need:
  - Classroom science materials that will engage all of our children's senses so that they can transition from concrete thought (hands-on experiences) to theoretical thought (verbal explanations); and
  - A variety of appealing nonfiction science that will introduce them to the vocabulary and sentence structures of scientific literacy.

# What needs to be Known to Teach Science

- A considerable amount of knowledge is available regarding teaching language arts and narrative discourse. We know:
  - The organizational structure of narrative
  - The cognitive/linguistic underpinnings for narrative
  - The developmental sequence of narrative structure acquisition
- In contrast,
  - Little information about the language requirements for scientific literacy
  - Information not available on the development of language for scientific literacy

# Testable Research Questions

- What linguistic patterns do students use when explaining the components of a science experiment?
- What organizational structures do students use when explaining the components of a science experiment?

# Method

- Students participated in supplemented 5<sup>th</sup> grade science lessons
  - Students conducted 3 experiments on a topic rather than 1.
  - Science magazines and tradebooks available in class for each topic
  - Mary Ellen, school SLP collaborated in science class 1 day/week
  - Carol participated 2-3 times/month; filmed lessons

# Method:

## Constructing Science Reports

- **First experiment:** teacher modeled each genre of the report by giving the procedures, results, and explanation
- **Second experiment:** teacher and students jointly constructed the procedures, results, and explanation of the report while the teacher writes it on an overhead projector
- **Third experiment:** students wrote the report independently in their journals

# Water Tension Examples



How many pennies can you put in a cup of pure water?

How many pennies can you put in a cup of soapy water?

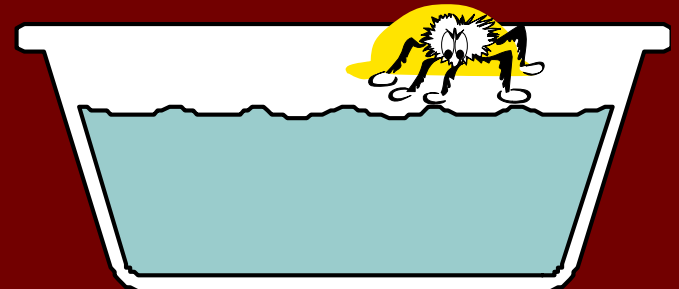
3 experiments on each topic

Put a drop of detergent behind the bug.  
What happens? Why?

How many drops of pure water can you put on a penny?



How many drops of soapy water can you put on a penny?



# Method:

## Teacher Modeling

### *Teacher Model for Procedural Genre*

First, we filled the cups with pure water to the rim. Then we carefully dropped pennies into the cup one by one. We counted each penny we dropped into the cup. We watched until we saw a drop of water flow over the rim of the cup. We recorded the number of pennies we had put in the cup before the water overflowed.

Next, we filled cups with water that had a little soap in it. We carefully dropped pennies into the cup one by one. We counted each penny we dropped into the cup. We watched until we saw the water overflow. We recorded the number of pennies we had put in the cup before the water overflowed.

### *Teacher Model for Results (descriptive) Genre*

The cup of pure water held 66 pennies before it overflowed. The meniscus of the water got higher and higher until a little water began to spill over the rim of the cup. The cup of water with detergent held only 18 pennies before the water overflowed. The meniscus of the water with detergent didn't get as high as the meniscus of the pure water.

### *Teacher Model for Explanation Genre*

Soap reduces the surface tension of water so the water molecules don't hold together as tightly. The cup with soapy water couldn't hold as many pennies as the cup of pure water because the soap reduced the water tension. Therefore, the soapy water overflowed sooner than the pure water.

# Method: Revoicing

Teacher revoiced students' statements by adding or deleting material or using different lexicalizations, that may teach, clarify, highlight, or reframe aspects of the student's utterance in relation to the desired academic content

- **Miguel:** The soap the chemicals in the soap they would like get in in the middle of the regular water and make it not hold together.
- **Teacher:** So Miguel, you're explaining that the soap molecules separated the water molecules and broke the water tension.
- **Mica:** Cuz, the soap holds down the pennies and the the bubbles from the pennies goes up and it floats and you put one more and it floats out.
- **Teacher:** So Mica, your suggesting that the soap bubbles caused the water to overflow the cup.

# Data Collection

- Children interviewed three times during the year following an experiment. Asked:
  - What did you do? Tell me all the steps or procedures you did in the experiment
  - What were the results of the experiment? Describe what you saw?
  - Why did that happen? Explain why...?
- Children maintained a journal in which students copied the teacher's model for the first experiment and wrote a report for the 2<sup>nd</sup> and 3<sup>rd</sup> experiments on each topic

# Data Analysis

- Transcripts entered into CLAN (Computerized Language Analysis System)
  - Mean length of T-unit determined
  - Types and frequency of connectives documented
- Holistic scores given to each of the three genres of the science report

# Holistic Rubric Developed for Scoring Scientific Reports

Level	Procedure Component	Results Component	Explanation Component
1	Steps of experiment not in order; or important steps omitted; irrelevant information included.	Many reported observations not relevant to the experiment or not accurate. Major important observations omitted.	No apparent understanding of why the event occurred.
2	Steps in order; major steps included; some irrelevant information included; likely to also have ambiguous reference.	Most reported observations relevant to the experiment, but some irrelevant comments included; some important observations may be omitted; may also include ambiguous reference.	Some understanding of the event, but the principle is not clearly stated, or it is not linked to the event, or there is additional erroneous information included in the explanation.

Level	Procedure Component	Results Component	Explanation Component
3	Steps in order and only relevant information included, but non-specific language used resulting in ambiguous reference (e.g., “She gave us some to put in there.”)	All reported observations are relevant to the experiment; all major relevant observations included; may be some ambiguity in reference.	Student conveys an understanding of the principle and links it to the event, but does not use precise scientific language.
4	Steps in order, only relevant information included, and little or no ambiguity of reference.	All important observations clearly described; little or no ambiguity of reference; use of scientific vocabulary. (If the experiment has involved a comparison, the comparison is explicitly described)	Student states the rule or principle that applies, the event that happened, and how the rule or principle is related to the event; little or no ambiguity of reference; use of scientific terms.
5	Steps in order, only relevant information included, and scientific vocabulary used.		

# Possible Roadblocks

- School officials don't want research to take time from academics
  - Response: Chose a topic that the principal and others in the school see as useful
    - Easier to get IRB approval
    - Provides support if potential roadblocks encountered
- Time for transcribing

# Dissemination of Results

- Kelly presented program and results at teacher study-group sessions in her school
- Kelly selected to coordinate program to develop science education for her school
- Poster session at the 2005 International Association for Study of Child Language in Berlin, Germany
- Rubric for study included in a book chapter
- Concepts incorporated into a research project funded by LASER to investigate development of scientific literacy in Spanish-speaking mid-school students

# Future Questions

- Do students use more complex syntactic structures when producing scientific expository genres than when producing narratives?
- Do Spanish-speaking students exhibit the same developmental patterns in scientific literacy as English-speaking students?
- Do students whose teachers use revoicing exhibit greater development in scientific literacy than students whose teachers do not use revoicing?

# Other Example Collaborations

ASHA Leader, 2002



American  
Speech-Language-  
Hearing  
Association

# The Phonology of Bilingual Children

(Goldstein & Swasey, 2002)

- University researcher (BG) and former graduate student (PS)
- BG initiated talks because of mutual interests; together they developed idea
- Spent one month reading relevant literature; planned and refined method
- Determined responsibilities:
  - BG: data analysis and writing article
  - PS: contact facilities, assess participants, review manuscript

# The Phonology of Bilingual Children

(Goldstein & Swasey, 2002)

- Contacted and obtained permission from principals
- Obtained school district permission (large obstacle)
- While PS was assessing, BG was writing introduction and method sections
- Plan did not always proceed as expected, but study completed successfully (N=12)
- Trust of each partner was singled out as most important factor leading to success

# Collaborating to Collect Phonological Acquisition Data (Hodson & Porter, 2002)

- Study initiated by group of school-based SLPs after 12 months of regular meetings discussing continuing concerns about norms; needed local norms
- JP obtained small “innovative projects” grant: assessment materials, instruction, and data analysis
- Invited BH to serve as research consultant
- SLPs attended six hours of instruction on transcription
- SLPs obtained data (N=520); study completed successfully; SLPs felt they learned much about research and local expectations
- Largest hurdle: time. (est. 30 hours per SLP)

# Self-Esteem Issues in Students with Speech and Language Impairments (Apel & Brown, 2002)

- Partnership developed out of friendship/other mutual experiences
- Brainstormed via email initially; then met to narrow to one idea
- Similar task assignments as Goldstein and Swasey
- Recruited help of another SLP to conduct post-testing (N=50)

# Self-Esteem Issues in Students with Speech and Language Impairments (Apel & Brown, 2002)

- Challenges: needed more face-to-face interactions; district administration (concern over not working with students); awareness of research design

# Partnering to Evaluate Classroom-Based Intervention

(Calvert, Paul, & Throneburg, 2002)

- Partnership initiated when PP contacted LC for material preparation by a student assistant; LC consented with notion of creating a research project; RT then came onboard
- Assignment of responsibilities occurred next
  - LC: literature review, treatment validity, project administration
  - PP: obtain sites and permission, treatment implementation
  - RT: develop research design, summarize and analyze data

# Partnering to Evaluate Classroom-Based Intervention (Calvert, Paul, & Throneburg, 2002)

- Conducted several studies successfully
- Challenges: time
- All learned more about what each other's expertise; knowledge and practice of EBP grew

# General Considerations for Conducting Research

- Be aware of own biases
  - Expectations
  - Knowledge of desired outcomes
  - Selective treatment of data
- Consider procedures that are replicable
- Value clinical and statistical significance

# Questions

# Final Thoughts

Action Plan:

Turn to a neighbor and describe how you might implement research in the workplace