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# Determining Best Practices and Interventions in Special Education

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# DETERMINING BEST PRACTICES AND INTERVENTIONS IN SPECIAL EDUCATION

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# Purpose



- To examine methods for determining evidence-based interventions and to identify best practices for meeting the individualized needs of students with disabilities.

# Background



- The paramount issue in special education 50 years ago was access.
  - In the 1970s
    - Up to 80% of students with disabilities were not in school
    - Congressional findings in 1974 indicated that more than 1.75 million students with disabilities did not have access to educational services in the United States
    - Until the *Education for All Handicapped Children Act* (PL 94-142) was passed in 1975, schools could exclude students based solely on their disability status

# Access versus *Effectiveness*



- While the *Education for All Handicapped Children Act* (1975) ensured access, it did little to influence, regulate, or assess the *efficacy* of services provided.

As a result...

- An *achievement gap* developed between students with disabilities and those without disabilities.

# Achievement Gap



- ❑ National studies demonstrate that an *achievement gap* exists between students with disabilities and their general education peers.
- ❑ This gap widens **every year** students are in school.
- ❑ Students with disabilities drop out at twice the rates of those without.
- ❑ College enrollment for students with disabilities is **50% lower** than the general population.

(See Deschler et al., 2001; NLT52, 2005; U.S. Department of Education Office of Special Education, 2002)

# Causes of the Gap



*“Ineffective teaching practices and unproven educational theories are among the chief reasons children fall behind” (No Child Left Behind, 2001).*

- Example: Process Training – *negative to negligible effects*
  - Perceptual Motor Training
  - Psycholinguistic Training
  - Irlen Lenses
  - Frostig Visual Perceptual Training

# Education Law

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- No Child Left Behind (NCLB, 2001)
  - ▣ Reducing the achievement gap was a key focus of the Act
  - ▣ NCLB requires scientifically-based instructional programs
  
- The Individuals with Disabilities Education Act (IDEA, 2004)
  - ▣ Requires *scientifically-based research*
    - “Research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs.”



*In summary...*



*The critical issue in special education  
today is **effectiveness**.*

# Special education . . .

. . . and the role of the **special educator**

# Special Education



- United States Federal Regulations define *special education* as
  - “Specially designed individualized or group instruction or special services or programs . . . to meet the needs of students with disabilities” (Department of Education, 2006).

# The Special Education Teacher



*“Teachers in classrooms are the final and probably the most powerful arbiters of how children with disabilities are taught”*

*(Mostert & Crockett, 1999-2000, p. 130).*

# The Special Education Teacher's Role

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# Research in Special Education

## *Single-Study Designs*

- Experimental Studies
- Quasi-Experimental Studies

## *Research Syntheses*

- Meta-analyses
- Narrative research syntheses

# Experimental Studies

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## □ Key Characteristics

- Random *selection* (important for generalization)
- Random *assignment* (important for internal validity)
- Compare two (or more) groups:
  - Group 1: No intervention
  - Group 2: Receives an intervention
  - (Group 3: Receives an alternative intervention)
- Strict control over intervention conditions
  - Training, ensuring treatment fidelity, time spent instructing, etc.

# Quasi-Experimental Studies



- Similar to *experimental studies*, but lacking **random assignment**
- Not as rigorous or reliable as true experimental studies



# Typical Experimental Designs

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- Gather baseline data for each group
  - Example: a pretest
- *Introduce* the intervention to one group, *withhold* from another
- Gather outcome data
  - Example: a posttest
- Use statistical analysis to compare the difference between groups
- Report the *effect size* (i.e., the *practical* significance of the findings)

# Effect Size (ES)

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- ❑ Required by the American Psychological Association (APA, 2010) in research reports in order for “the reader to appreciate the magnitude or importance of a study’s findings” (p. 34).
- ❑ Show the *practical significance* of the findings.
- ❑ Can be interpreted as z scores or standard deviation units.
- ❑ Range from 0 (no effect) to 1.00+ (large effect)
- ❑ Can be used to determine level of **differentiation** between groups **OR** the **strength** of a treatment effect.
- ❑ With standardized achievement tests, an ES of 1.00 represents one year of growth.

# Calculating and Interpreting ES

## □ ES Calculation

$$ES = \frac{\text{Mean of experimental group} - \text{mean of control group}}{\text{Standard deviation}}$$

## □ ES Interpretation

- Cohen's "rule of thumb"
  - 0.0 = no effect
  - 0.2 = small effect
  - 0.5 = medium effect
  - 0.8+ = large effect

# Example: Process Training

Method	Mean ES	Percentile Rank Equivalent	Power Rating
Irlen Lenses	<b>-0.02</b>	49	<b>Negative</b>
Perceptual-Motor Training	<b>0.08</b>	53	<b>Negligible</b>
Diet Modification (Feingold)	<b>0.12</b>	55	<b>Small</b>
Modality-Matched Instruction	<b>0.14</b>	56	<b>Small</b>
Social Skills Training	<b>0.23</b>	64	<b>Small</b>
Psycholinguistic Training	<b>0.39</b>	65	<b>Small-Medium</b>
Frostig Visual Perceptual Training	<b>0.10</b>	54	<b>Negligible-Small</b>

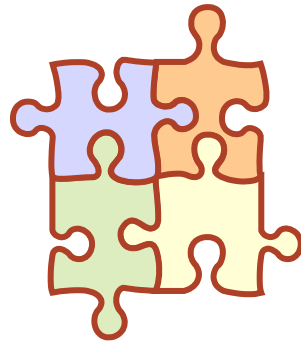
# Criticisms of Single Experimental Studies

- Classroom studies are too context dependent (i.e., too many extraneous variables to control) to conclude one IV effects one DV (Hirsch, 2002).
- Results from individual studies can conflict (Kavale, 2007; Mostert, 2001).
- “A single study, no matter how elegant, is unlikely to provide a definitive evaluation” (Mostert & Kavale, 2001, p. 57).

# Solution?

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*Synthesizing* research on a single topic.



(See Forness, 2001; Hirsch, 2002; Kavale, 2001; Mostert, 1996; Swanson, 1996)

# Meta-Analysis



- Was first developed and used in agricultural science before being used in psychology and education.
- Gene Glass (1976) reintroduced the method as a way to combine *quantitative* findings.
- Includes many experimental research studies on a topic.
- Combines statistical/numerical results (i.e., effect sizes) to determine the overall magnitude of results.
- Used to determine the strength of an intervention or amount of difference between groups.

**TABLE 2**  
**Descriptive Information and Effect Sizes for Qualifying Single-Case Studies (N = 18)**

Study	N/X Age/Grade	Measure	Effect Size
Lane, Little, et al. (2007)	Treatment = 7 Age = — Grade = 1	Nonsense Word Fluency	+1.83
		Oral Reading Fluency	+1.72
Sutherland and Snyder (2007)	Treatment = 4 Age = — Grade = 6–8	Oral Reading Fluency	+0.61
Allen-DeBoer et al. (2006)	Treatment = 4 Age = — Grade = —	Words Read Correctly	+0.82
		Standardized Reading Assessment	+0.75
		Oral Reading Fluency	+0.47
		Reading Comprehension	+0.57
Barton-Arwood et al. (2005)	Treatment = 6 Age = — Grade = 3	Nonsense Word Fluency	+1.24
		Oral Reading Fluency	+1.06
Staubitz et al. (2005)	Treatment = 6 Age = — Grade = 4–5	Word Attack	+0.19
		Oral Reading Fluency	+0.28
		Letter-Word Identification	+0.44
		Reading Comprehension	+0.84
Wehby et al. (2005)	Treatment = 4 Age = — Grade = K	Initial Sound Fluency	+0.69
		Nonsense Word Fluency	+1.12
		Letter Naming Fluency	+2.11
Strong et al. (2004)	Treatment = 6 Age = — Grade = 7–8	Oral Reading Fluency	+1.49
		Reading Comprehension	+1.47
Wehby et al. (2003)	Treatment = 8 Age = 7–10 Grade = —	Letter-Word Identification	–0.09
		Phonological Awareness	+0.26
		Phonological Memory	+0.41
		Word Attack	+0.58

Benner, G. J., Nelson, R. J., Ralston, N. C., & Mooney, P. (2010). A meta-analysis of the effects of reading instruction on the reading skills of students with or at risk of behavioral disorders. *Behavioral Disorders, 35*(2), 86-102.



# Meta-analytic Procedures



- Parallel the scientific method:
  - Formulating a problem
  - Sampling
  - Classifying and coding studies
  - Data analysis
  - ES interpretation

# Meta-analysis: Summary



- Used to synthesize *quantitative* findings across multiple studies on a single topic
- Used to determine the strength of an intervention or difference between groups
- A useful *summative* tool for determining “what works” in special education
- Used to support or refute general findings

# But, Be Aware . . .



- Meta-analyses are
  - ▣ subject to publication bias or the “file drawer effect”
  - ▣ limited by the amount of information reported in the primary study
  - ▣ can give the impression that results are definitive

*However . . .*

- ▣ These deficiencies have been addressed by researchers (e.g., Swanson, 1996; Mostert, 1996) who have proposed guidelines to allow for better evaluation and replication of meta-analyses.

# Meta-Analysis: Example

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- The National Reading Panel's (2001) meta-analysis evaluating the effects of *systematic phonics instruction* versus *unsystematic phonics instruction*:
  - ▣ 38 primary experimental studies
  - ▣ 66 comparisons between treatment and control groups
- Overall effect:
  - ▣  $ES = 0.41$  (moderate)
- Conclusion:
  - ▣ Systematic phonics instruction was more effective for teaching reading than all forms of control group instruction, including whole language.

# Mega-analysis



- A meta-analysis of meta-analyses
  - Synthesizing findings from multiple meta-analyses  
(Forness, Kavale, Blum, & Lloyd, 1997)

## Mega-Analysis of Effective Instructional Approaches

Practice	Mean ES	Practice	Mean ES
Behavioral Interventions	0.98	Strategies	1.26
Self-regulation	1.38	Self-Monitoring	1.74
Applied Behavior Analysis	0.93	Mnemonic Devices	1.51
Peer Mediation	0.64	Self-Questioning	1.04
Instructional aids	0.89	Repeated reading	0.76
Visual Displays	0.9	Teacher practices	1.2
Computer-Assisted Instruction	0.87	Systematic instruction	2.18
Grouping practices	0.59	Reinforcement	1.17
Groups	1.01	Drill & Practice	0.99
Peer Tutoring	0.58	Strategy Based Instruction	0.98
Partners	0.4	Feedback	0.97
Multiple group formats	0.36	Direct Instruction	0.93
Instructional Arrangements	0.58		
Tutoring (tutors/paraprofessionals)	0.76		
Co-teaching	0.4		

From Kavale, K. A., & Spaulding, L. S. (in press). The efficacy of special education. In M. A. Bray & T. J. Kehle (Eds.), *Oxford Handbook of School Psychology*. New York, NY: Oxford University Press.

# However...

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- What if the findings on a specific topic are not all quantitative?



- Look for a *narrative research synthesis* (an integrative review)

# Narrative Research Syntheses



- *Qualitative* in nature
- Include multiple kinds of studies on a topic (i.e., experimental, quasi-experimental, survey research, case studies, etc.)
- Serve to find patterns, trends, or themes in research
- Used to analyze the strengths and weaknesses of primary studies
- The purpose is to summarize and draw conclusions from multiple studies

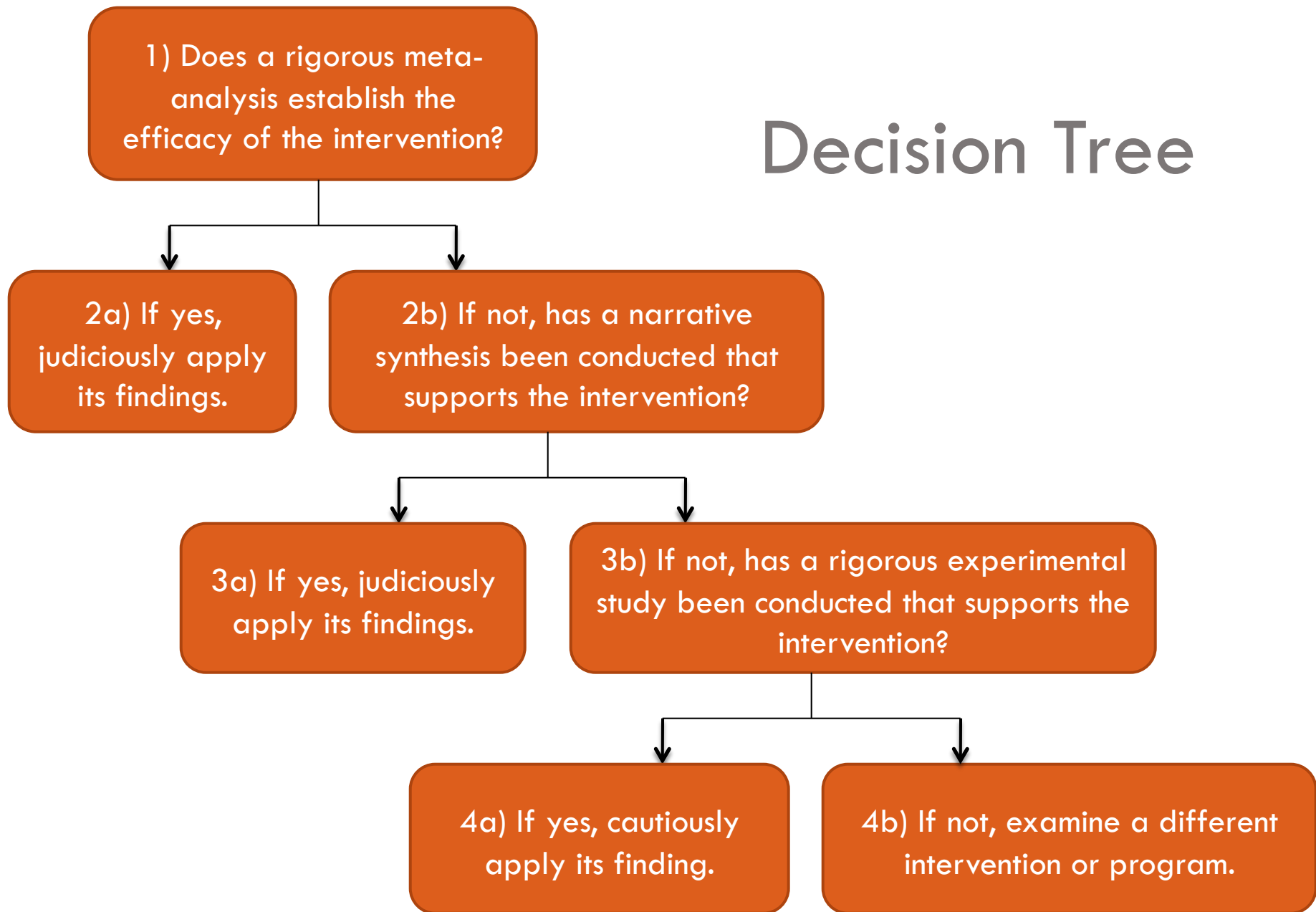


# Narrative Research Synthesis: Example



- Mostert's (2001) assessment of facilitated communication (FC) as a technique with people with autism and other noncommunicative disorders.

# Decision Tree



# The Importance of Rigorous Primary Experimental Studies



- When an intervention is new or just developing, conducting a meta-analysis or narrative research synthesis is premature.
- Both meta-analyses and narrative research syntheses rely on *sound* primary research studies.

# Decision Making



- In special education, the needs are too great and the time and resources too few to invest in interventions not yet validated by multiple rigorous research studies.

# Popular Intervention Lacking Empirical Validation

- Brain Gym®

- A popular commercial program
- Has intuitive appeal
- Claims to be founded on brain-based research

However....

- *To date there are no true experimental studies validating the intervention.*

- For a full report, see

- Spaulding, L.S., Mostert, M. P., & Beam, A. P. (2010). Is Brain Gym an effective educational intervention? *Exceptionality*, 18(1), 18-30.

# Conclusion



- Special education has a heightened responsibility for being accountable:
  - It “serves students and families who are especially dependent on receiving effective services and who are especially vulnerable to fraudulent treatment claims” (Malouf & Schiller, 1995, p. 223).

# Subject Specific Meta-Analyses

- Reading
- Math
- Instructional Practices
- Placement
- Speech/Language
- Early Intervention/Pre-referral
- Behavioral Interventions
- Assistive Technology
- Medication
- Special Education/Related Services
- Social Skills
- Grouping Strategies
- Learning Disabilities
- Autism
- Transition/Employment

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