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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* then the general population.

(See Deschler et al., 2001; NLTS2, 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

- 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

Research in Special Education

Single-Study Designs

- Experimental Studies
- Quasi-Experimental Studies

Research Syntheses

- Meta-analyses
- Narrative research syntheses

Experimental Studies

- 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

- 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)

- 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

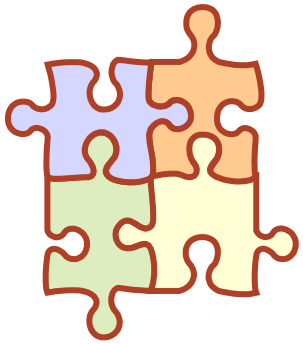
Method	Mean ES	Percentile Rank Equivalent	Power Rating
Irlen Lenses	**-0.02**	49	**Negative**
Perceptual-Motor Training	**0.08**	53	**Negligible**
Diet Modification (Feingold)	**0.12**	55	**Small**
Modality-Matched Instruction	**0.14**	56	**Small**
Social Skills Training	**0.23**	64	**Small**
Psycholinguistic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

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?

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 Oral Reading Fluency	+1.83 +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 Standardized Reading Assessment Oral Reading Fluency Reading Comprehension	+0.82 +0.75 +0.47 +0.57
Barton-Arwood et al. (2005)	Treatment = 6 Age = — Grade = 3	Nonsense Word Fluency Oral Reading Fluency	+1.24 +1.06
Staubitz et al. (2005)	Treatment = 6 Age = — Grade = 4–5	Word Attack Oral Reading Fluency Letter-Word Identification Reading Comprehension	+0.19 +0.28 +0.44 +0.84
Wehby et al. (2005)	Treatment = 4 Age = — Grade = K	Initial Sound Fluency Nonsense Word Fluency Letter Naming Fluency	+0.69 +1.12 +2.11
Strong et al. (2004)	Treatment = 6 Age = — Grade = 7–8	Oral Reading Fluency Reading Comprehension	+1.49 +1.47
Wehby et al. (2003)	Treatment = 8 Age = 7–10 Grade = —	Letter-Word Identification Phonological Awareness Phonological Memory Word Attack	−0.09 +0.26 +0.41 +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

- 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…

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

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

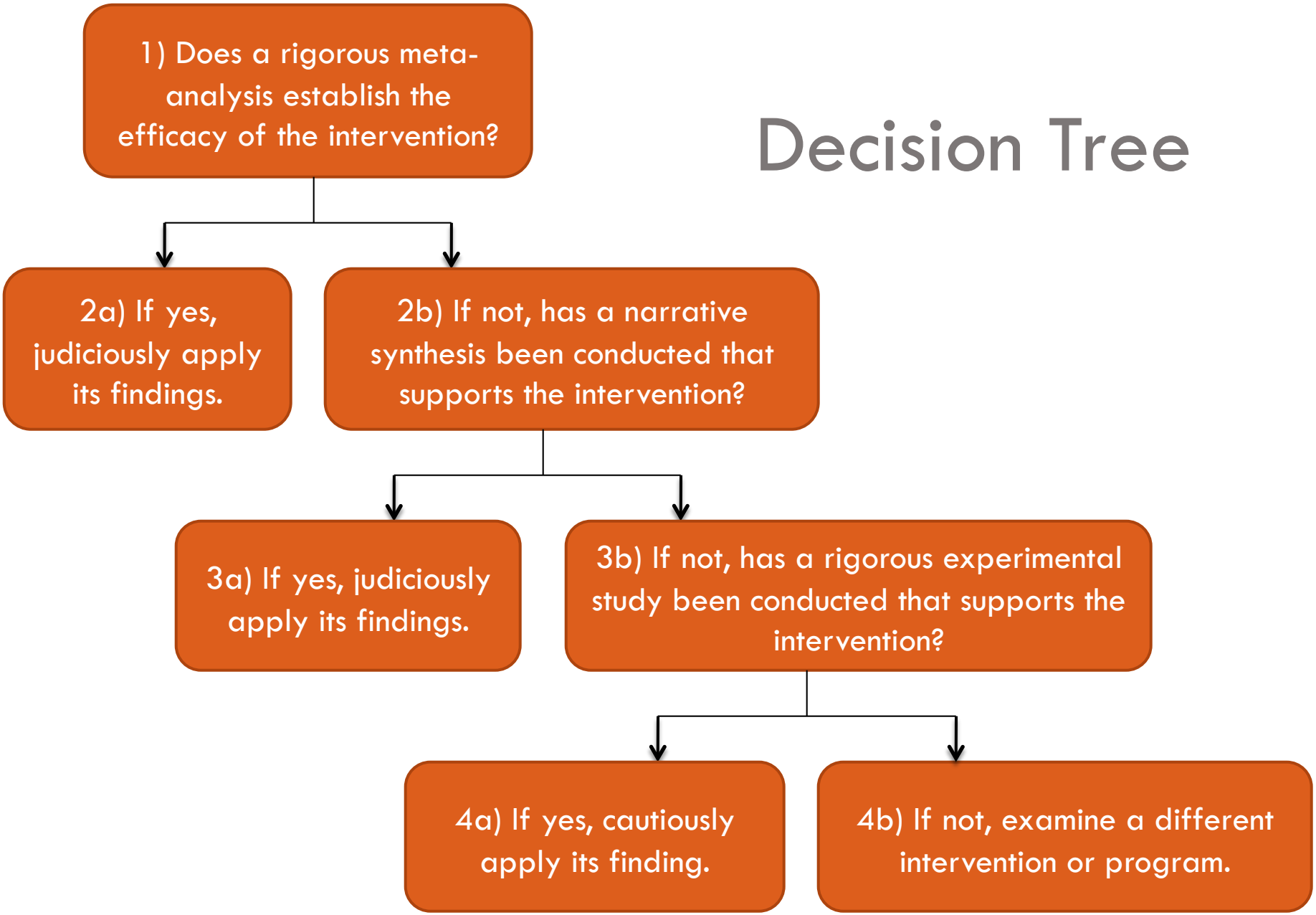
Narrative Research Syntheses

- *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

Reading

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