Understanding ESSA Levels of Evidence & their Application to Program Evaluation

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Acknowledgement and disclaimer

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Session Outline

• Overview of the four ESSA Levels
• ESSA and Non-Regulatory Guidance
• Requirements for strong evidence
• Requirements for moderate evidence
• Promising evidence and demonstrates a rationale
• Applying ESSA levels of evidence to program evaluation
# Overview of the Four Levels of Evidence

<table>
<thead>
<tr>
<th>Level</th>
<th>Requirements</th>
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<tbody>
<tr>
<td>Strong</td>
<td>• At least one well-designed and implemented experimental study</td>
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<tr>
<td>Moderate</td>
<td>• At least one well-designed and implemented quasi-experimental study</td>
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<tr>
<td>Promising</td>
<td>• At least one well-designed and implemented correlational study</td>
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<td></td>
<td>• Includes controls for statistical bias</td>
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<tr>
<td>Demonstrates a Rationale</td>
<td>• Well specified logic model or theory of action</td>
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<td>• Includes ongoing efforts to collect evidence</td>
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ESSA and Non-Regulatory Guidance

- ESSA identifies four levels of evidence
- The Department of Education’s Non-Regulatory guidance provides recommendations, resources, and criteria for each of those levels
- The following slides build on that guidance to provide more detailed information about each level
- However, states are free to interpret and apply the four ESSA levels differently
What Works Clearing House

• Non-regulatory guidance on ESSA draws from WWC standards
• WWC rates studies as:
  • Meets standards without reservations = strong evidence
  • Meets standards with reservations = moderate evidence
  • Does not meet standards = promising or demonstrates a rationale
• WWC is a useful resource for finding and evaluating studies
  • https://ies.ed.gov/ncee/wwc/
Strong Evidence

- A well-designed and implemented experimental study
- Experiments require
  - An intervention or treatment
  - Subjects who receive the treatment and ones who do not
  - Subjects assigned randomly
- What is a “well-designed and implemented” experiment as defined by the WWC?
  - Appropriate randomization
  - Attrition
  - Confounds
- These types of studies can meet What Works Clearinghouse standards without reservations
Randomization

• Randomization is critical
  • Random assignment ensures the treatment and control groups are as similar as possible
  • Without randomization, unobserved characteristics may interfere
• Random is defined as entirely by chance and every subject has a chance to be in either group
• Assignment occurs before the intervention
Attrition

- Attrition is the loss of subjects from the study
  - Attrition is common but
  - When attrition is high it compromises the outcome of random assignment
- Two types of attrition
  - Overall
  - Differential
- WWC offers guidance on attrition standards* but at a minimum always look at how many subjects dropped out of a study

Confounds

- Confounds are aspects of the experiment completely aligned to one group
  - Ex. One classroom is the intervention and one is the comparison
  - Ex. Intervention students are all ELs but comparison group has no ELs
  - Ex. Intervention is part of a larger package
- Confounds introduce an additional factor that compromises randomization
Summary of Strong Evidence

- ESSA requires a well-designed and implemented experimental study
- WWC standards for this are:
  - Treatment and control groups
  - Random assignment to groups
  - Low attrition
  - No confounding factors
- As a result, would likely meet WWC standards without reservations
Moderate Evidence

- A well-designed and implemented quasi-experimental design (QED) study
  - QEDs lack randomization
  - Instead they leverage some natural change to create groups
  - Ex. Comparing before and after a policy change
- ESSA does not define what is well-designed or implemented
- However, generally a well-designed QED has the following
  - Strong break or forcing factor
  - Baseline equivalence
- These types of studies can meet WWC standards with reservations
Forcing Variable

• The forcing variable or break point is the factor that creates the different groups

• The variable should be consistent and clear
  • Ex. A stable cut-score on a test allows comparing those just above and below the cut-off
    • But not if exemptions are permitted
  • Ex. A change in policy allows comparing those before and after
    • But not if the policy change is implemented at different times
Baseline Equivalence

• Baseline equivalence is whether or not the intervention and comparison groups are similar on a key characteristic
• Without random assignment, the groups could differ
• Studies must take steps to demonstrate the groups were equivalent *prior to* the intervention (i.e., at baseline)
• Baseline should be established on a characteristic similar to the outcome or correlated with it
  • Ex. Prior year test score or a pre-test
Baseline Equivalence, continued

• According to non-regulatory guidance
  • If equivalence can be established, the study can be considered moderate evidence
  • If the baseline differences are small, statistical controls can be used
  • If the baseline differences are large, the study is not well-designed and implemented
Summary of Moderate Evidence

• ESSA requires a well-designed and implemented quasi-experimental study
• ESSA does not define what is well-designed or implemented
• However, generally a well-designed QED has the following
  • At least two groups for comparison
  • Establishment of baseline equivalence
Promising Evidence

• At least one well-designed and implemented correlational study that includes controls for statistical bias
  • Correlational means the study looks at associations, not impacts
  • Typically has one group and examines predictors of an outcome
  • Controls are other key variables related to the outcome but not part of the research question
• These types of studies cannot meet WWC standards
Promising, continued

• Correlational studies cannot measure impacts
  • No random assignment
  • No comparison groups
  • No ability to establish baseline equivalence

• Ex. Study shows students who report reading more books score higher on end of year test
  • Controls for prior test scores, race, gender, and economic status
  • But measures only the association between reading and scores
  • Cannot conclude that assigning more books to read would increase scores
Summary of Promising Evidence

• Only one study group
• Uses terms like relationship, covariate, association, and predictor
• Uses statistical controls
Demonstrates a Rationale

- Well specified logic model or theory of action
  - What features of the intervention seem likely to result in improved outcomes?
  - What is the connection between the intervention and the outcome?
- Includes ongoing efforts to collect evidence
  - How will you evaluate the results?
Debrief Questions

• Do you have any questions about the 4 ESSA levels of evidence?

• What obstacles do you face in finding strong levels of evidence for programs/interventions?

• If an adequate evidence level for a program/intervention does not exist for your population of students, how could your district consider evaluating the program/intervention yourselves?
Applying ESSA Levels of Evidence to Program Evaluation

• What is the intended/stated goal of the program evaluation?
• What are the effective components of the program? [Derived from research-based constructs?]
• What are the relevant outcomes?
• What are the direct (and indirect) effects between the program and intended outcomes?
• Was the program delivered with fidelity?
<table>
<thead>
<tr>
<th>Review Criteria</th>
<th>Comments</th>
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<tbody>
<tr>
<td><strong>All Studies</strong></td>
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<tr>
<td><strong>Literature Review</strong> – Review the authors’ theoretical framework, definition of concepts, and the conceptual basis for the study.</td>
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<tr>
<td><strong>Research Questions</strong> – Identify the research questions and their appropriateness to the theoretical framework</td>
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<tr>
<td><strong>Methodology</strong> – What is the population?</td>
<td></td>
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<tr>
<td><strong>Methodology</strong> – What is the sample?</td>
<td></td>
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<tr>
<td><strong>Methodology</strong> – What is the intervention?</td>
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<tr>
<td><strong>Methodology</strong> – Is there a control or comparison group? If there are two or more groups, are they randomly assigned?</td>
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<tr>
<td><strong>Methodology</strong> – Based on the answers above, what is the study design (RCT, QED, Correlational, other)?</td>
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<tr>
<td><strong>RCTs (Potentially Strong Evidence)</strong></td>
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<tr>
<td><strong>Methodology</strong> – Is there evidence of a confound?</td>
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<td><strong>QEDs (Potentially Moderate Evidence)</strong></td>
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<tr>
<td><strong>Methodology</strong> – How were the groups established? Was the criterion clear and consistent?</td>
<td></td>
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<tr>
<td><strong>Methodology</strong> – Do the authors examine baseline equivalence?</td>
<td></td>
</tr>
<tr>
<td><strong>Correlational Studies (Potentially Promising Evidence)</strong></td>
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<tr>
<td><strong>Methodology</strong> – What is the predictor or independent variable? Is there more than one?</td>
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<tr>
<td><strong>Methodology</strong> – What are the statistical controls? Are they appropriate?</td>
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<tr>
<td><strong>Other Study Designs (Demonstrates a Rationale)</strong></td>
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</tr>
<tr>
<td><strong>Methodology</strong> – Is there a logic model? If not, is the theoretical framework clear?</td>
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<tr>
<td><strong>Results</strong> – Are the results conclusive, and appropriate given the study design?</td>
<td></td>
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<tr>
<td><strong>Discussion</strong> – Are the conclusions appropriate to the results and are limitations appropriately discussed by the author?</td>
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Using a Logic Model for Planning Program Evaluation

Logic models are visual representations of the theory of action underlying educational programs and interventions

A logic model exercise completed by the planning team can:

• Lead to consensus on final program outcome(s)
• Determine inputs (resources) to consider in the process
• Determine outputs (activities to complete expected products)
• Determine short, medium, and long-term outcomes
  • In many evaluation projects, these are typically teacher & student outcomes
• Consider assumptions & external factors that may impact planning & delivery of the program
Sample Logic Model

Supporting Teacher Enactment of the Probability and Statistics Standards (STEPSS)

Regional Educational Laboratory Southeast

**Example #1: STEPSS**

### Inputs
- School-based teams of public school teachers of seventh grade mathematics
- Public school students taking 7th grade, regular or advanced, mathematics course (i.e., M/J 2, M/J 2A)
- Subject-matter experts in probability, statistics, statistics education, and teacher professional development
- Instructional materials created and vetted by experts at the American Statistical Association to form a replacement unit for the currently adopted curriculum for the statistics and probability domain
- Protocols to support weekly meetings to engage in collaborative inquiry into teaching and learning of statistics

### Activities
- 2-day summer workshop for seventh-grade mathematics teachers based around the lessons in the replacement unit
- Two days follow-up sessions during school year and before the statistics and probability unit
- Homework assignments between workshops to guide teachers to prep for teaching the replacement unit
- Implementation of lesson plans in the replacement unit, which were experienced by teachers in the four days of workshops

### Outputs
- Attendance at workshops
- Reading, problem-solving, and discussion assignments
- Enactment of the statistics and probability standards
- Focused, on-going discussion among teams concerned with student thinking, teaching, and learning

### Products
- Increased involvement of students in the statistical problem-solving process, which includes: (1) Formulate a statistical question, (2) Plan data collection and collect data, (3) Analyze the collected data, and (4) Interpret the results in the context of the original question.
- Higher achievement on the items pertaining to the statistics and probability domain on the seventh-grade Florida Standards Assessment (FSA) for mathematics
- Increased conceptual understanding of statistics among seventh-grade mathematics students as measured by the LOCUS test

### Outcomes
- Increased richness of classroom discourse in statistics and probability instruction as measured by the Instructional Quality Assessment (IQA)

### External Factors
- Accountability system includes statistics as part of mathematics subject area
- Counterfactual condition is using the GoMath! resources and district pacing

### Assumptions
- Teachers will attend the workshops and complete all assignments
- District and school leaders will support teachers in supplementing or replacing instructional resources and adjusting the pacing and scope of statistics teaching
Ex #2: Impact of Word Knowledge Instruction on Literacy Outcomes in Grade 5 (Foorman et al.)

• Addresses Hillsborough County Public School’s (HCPS) and the nation’s growing achievement gaps due to English language proficiency and socio-economic status through a rigorous RCT

• Measures the impact of Word Knowledge Instruction on:
  --awareness of the meanings of prefixes & suffixes;
  --vocabulary and syntactic knowledge, and
  --reading comprehension
The Impact of Word Knowledge Instruction on Literacy Outcomes in Grade 5

This study will measure the impact of Word Knowledge Instruction on:
- awareness of the meanings of prefixes and suffixes,
- vocabulary and syntactic knowledge, and
- reading comprehension.

Requirements to Participate
- Approximately 44 schools
- At least 60% of students eligible for free or reduced price lunch
- At least 2 English Language Arts teachers of record in grade 5
- Schools with English learner students will be prioritized

Random Assignment Within Schools
- 50% Word Knowledge Instruction
- 50% Business-As-Usual Instruction

Student Benefits
- Standards-based instruction that:
  - Increases awareness of the meanings of prefixes and suffixes
  - Enhances academic vocabulary knowledge
  - Enables inferencing of new word meanings
  - Facilitates comprehension of text

Teacher/School Benefits
- $500 to each school to support grade 5 instruction
- Free PD for teachers randomly assigned to the Word Knowledge condition and an honorarium for summer training
- If Word Knowledge Instruction proves effective, instructional lessons and PD materials will be provided free to HCPS

Time Table
- 20 weeks of instruction
- 15-minute daily Word Knowledge Instruction in place of current district word study

2018/19 school year: September 10, 2018 through mid-March, 2019
## Word Knowledge Instruction Logic Model

<table>
<thead>
<tr>
<th>Support &amp; INPUTS</th>
<th>Core Components &amp; ACTIVITIES</th>
<th>Curriculum-based OUTPUTS</th>
<th>Distal OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>District partnership with REL Southeast</td>
<td>Focus on academic vocabulary, affixes, and connectives with repetition and feedback</td>
<td>High performance on curriculum-based measures of morphological awareness including</td>
<td>Academic Vocabulary</td>
</tr>
<tr>
<td>Initial training for teachers</td>
<td>Deconstruct words and construct sentences</td>
<td>Real word decomposition task</td>
<td>(FAIR-FS VKT)</td>
</tr>
<tr>
<td>Access to instructional materials</td>
<td>Learn words in meaningful contexts</td>
<td>Nonword derivation task</td>
<td>Syntactic Knowledge</td>
</tr>
<tr>
<td>Continued PD support</td>
<td>Define words; pair with synonyms; make connections to familiar topics</td>
<td>Inferencing word meaning task</td>
<td>(FAIR-FS SKT)</td>
</tr>
<tr>
<td></td>
<td>Contrast base words with derivational conversions; contrast morpheme family trees</td>
<td></td>
<td>Reading comprehension</td>
</tr>
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<td></td>
<td></td>
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<td>(FSA ELA)</td>
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PICO Framework: Useful in Evaluating Evidence

Debrief Questions

• What is a program/intervention/set of strategies you would like to evaluate?
• What are your research questions?
• What is your theory of action (logic model)?
• How will you determine fidelity of implementation?
• What are the obstacles to your evaluation? Solutions?
Questions?

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