PANEL 1: Models for Teacher Training and Professional Development Across Content Areas
Friday, Feb. 2, 2018, 8:00-10:00 a.m.
Constellation A

Panel Organizer(s): Jessica Toste, University of Texas at Austin

Presentation 1: The Effects of a State-Implemented Co-Teaching Training on Students’ Mathematics Achievement Scores
Presenter(s): Kaitlin Bundock, Utah State University
Additional author(s) not presenting: Kristen Rolf
Description: This Presentation describes a state-implemented Co-Teaching professional development project and analyzes student mathematics achievement data from classrooms participating in the project, as well as comparison non-co-taught general education and special education resource classes. Preliminary results indicate that students with and without disabilities make significant yearly gains in co-taught classes.

Presentation 2: Practice-Based Professional Development with Writing-to-Learn in Science: A Design Research Project
Presenter(s): Sally V. Drew, Central Connecticut State University
Jeff Thomas, Central Connecticut State University
Description: This Presentation describes a design-based research project that investigated the context and impact of three phases of a professional development project, introducing 32 middle school science teachers to pedagogical shifts required to help students meet rigorous writing expectations outlined in Next Generation Science Standards and Common Core State Standards.

Presentation 3: Improving Adolescent Literacy in Co-Taught Content-Area Classrooms: A Professional Development Approach
Presenter(s): Devin M. Kearns, University of Connecticut,
Additional author(s) not presenting: Jade Wexler, Chris Lemons
Description: Project CALI is an IES-funded Goal 2 study to improve literacy instruction for students in co-taught inclusive content-area classrooms in middle schools through professional development. In this presentation, we present the professional development and instructional strategies and share descriptive data from participants about the value of CALI in their schools.

Presentation 4: A Distributed Professional Development Model Featuring STRIVE in 4th Grade Social Studies
Presenter(s): Elizabeth Swanson, University of Texas at Austin
Additional author(s) not presenting: Philip Capin, Elizabeth Stevens
Description: This study investigated the effects of differential levels of professional development (school-supported versus researcher-supported) for teaching content area reading strategies in 4th grade social studies classrooms. Students in both treatment conditions significantly outperformed those receiving typical social studies instruction on proximal measures of content and vocabulary knowledge, but not on a standardized reading comprehension measure.
PANEL 2: Explaining Difficult-to-Remediate Students: The Role of Mediators and Moderators in Understanding Findings and Customizing Treatments
Friday, Feb. 2, 2018, 8:00-10:00 a.m.
Constellation B

Panel Organizer(s): Doug Fuchs, Vanderbilt University
Discussant: Russell Gersten, Instructional Research Group

Panel Overview:
The focus of this session is how mediators and moderators of intervention effects can provide insight into child-level variables that help explain response to intervention. Collectively, the talks examine sources of difficulty that help explain poor response to intervention, with implications for how to extend the intervention efficacy by addressing individual student needs. Sharon Vaughn presents a study examining the effectiveness of a researcher-provided small-group intervention for 4th graders with significant reading difficulties, with students randomly assigned to a researcher-provided 1-year treatment, 2-year treatment, or comparison condition. The 1- and 2-year treatments emphasized multi-syllable word reading, fluent reading of high-frequency words and phrases, and self-regulation practices to improve text comprehension. Fourth-grade students with Gates-MacGinitie standard scores <86 entered the study and were randomly assigned to researcher-provided intervention for 1 year (n=160), researcher-provided intervention for 2 years (n=161) or BAU (n=161). Effect sizes indicated students in the researcher-implemented treatment generally outperformed students in BAU. On standard score growth, both groups made significant gains with pre-to-posttest increases of 3 standard score points on decoding, 5 on fluency, and 2 to 7 on a range of reading comprehension measures. In this talk, our main focus is initial reading status as a moderator of the treatment effect on reading achievement at the end of year 1 and year 2 and the role of executive functioning in determining responsiveness to intervention.

Lynn Fuchs presents an RCT designed to assess the added value of embedding executive function (EF) instruction within fractions intervention. Third-grade students at-risk for poor fractions learning were randomly assigned to: fractions intervention, fractions intervention with embedded instruction focused on goal-directed behavior and perseverance through challenging tasks, and BAU (control). Results revealed advantages for the embedded EF condition. The embedded EF condition outperformed BAU on the NAEP outcome, while the core program alone did not (ES = 0.56 vs. 0.10) and with the embedded condition outperforming BAU on the multiplication outcome, while the core program alone did not (ES = 0.78 vs. 0.26). On Ordering fractions, both interventions outperformed BAU (ES = 1.76 for the embedded condition and 1.29 for the core program alone). Most interestingly, on Word Problems (WPs), the embedded condition outperformed BAU, with an ES of 0.78. Although the main effect for the core program alone versus BAU was also significant, pretest WP performance moderated the effect of the core program versus BAU (not the case for the embedded condition vs. BAU). This moderation indicates that the WP outcome was consistently higher for the core program than BAU. However, although the correlation between pretreatment and posttreatment score was not significant, the correlation between pretreatment and posttreatment score was significant in the core program alone. This suggests that students responded more adequately to the core program if their pretest fraction word-problem performance was stronger. The fact that this moderation effect was not significant for the contrast between the embedded intervention versus BAU shows that the EF component protected students against the effects of pretest skill in determining responsiveness to intervention.

Doug Fuchs and colleagues are engaged in a 5-year effort to develop a program to be used to strengthen at-risk students’ reading comprehension (RC) in informational texts. The program is comprehensive in 2 ways: It consists of many before-, during-, and after-reading strategies; and it includes working memory (WM) training to strengthen children’s related cognitive processes. In this session, Fuchs will describe a study conducted with 3 treatment groups and a control group. The first 2 treatments included RC instruction-RC alone (hereafter, ’COMP’) and COMP with embedded WM training (hereafter, ’[WM]COMP’). A third treatment consisted of WM only. Hence, this study in part explored the value of domain-specific ([WM]COMP) vs. domain-general (WM) training. It
was conducted across 2 years in grades 3-4. 198 children came from 91 classrooms in 19 schools. Third and fourth graders performing, respectively, at the 19th and 14th percentiles on the CELF, were randomly assigned by grade and school to the 4 study groups. The 3 treatments were conducted in 42 sessions 3x per week for 14 weeks. They were tutored 1:1 in 25 min sessions. Findings indicated no differences on an RC factor score between the COMP and [WM]COMP conditions. The two conditions were combined in subsequent analyses and, multi-level modeling indicated that children in the combined condition outperformed controls (ES = .26). This masked strongly differential performance at 3rd and 4th grades, with highly significant effects (ES = .53) at 4th grade. Students with poorest attention ratings performed reliably better on the RC factor score after either RC or WM treatment than similar control children.

Russell Gersten provides commentary on the three talks, focusing on recent work on the importance of building mathematics proficiency and language proficiency at an early age.

Presentation 1: How Initial Reading Comprehension Status and Executive Functioning Affect Response to Intervention for Students with Reading Disabilities Assigned to One or Two Years of Treatment
Presenter(s): Sharon Vaughn, University of Texas at Austin
Additional author(s) not presenting: Greg Roberts, Jeremy Miciak, Yusra Ahmed, and Phil Capin
Description: Sharon Vaughn presents a study examining the effectiveness of a researcher-provided small-group intervention for 4th graders with significant reading difficulties, with students randomly assigned to a researcher-provided 1-year treatment, 2-year treatment, or comparison condition. The 1- and 2-year treatments emphasized multi-syllable word reading, fluent reading of high-frequency words and phrases, and self-regulation practices to improve text comprehension. Fourth-grade students with Gates-MacGinitie standard scores <86 entered the study and were randomly assigned to researcher-provided intervention for 1 year (n=160), researcher-provided intervention for 2 years (n=161) or BAU (n=161). Effect sizes indicated students in the researcher-implemented treatment generally outperformed students in BAU. On standard score growth, both groups made significant gains with pre-to-posttest increases of 3 standard score points on decoding, 5 on fluency, and 2 to 7 on a range of reading comprehension measures. In this talk, our main focus is initial reading status as a moderator of the treatment effect on reading achievement at the end of year 1 and year 2 and the role of executive functioning in determining responsiveness to intervention.

Presentation 2: The Added Value of Embedded Executive Function Instruction within Fractions Intervention
Presenter(s): Lynn Fuchs, Vanderbilt University
Additional author(s) not presenting: Lynn S. Fuchs, Amber Wang, Amelia Malone, and Doug Fuchs
Description: Lynn Fuchs presents an RCT designed to assess the added value of embedding executive function (EF) instruction within fractions intervention. Third-grade students at-risk for poor fractions learning were randomly assigned to: fractions intervention, fractions intervention with embedded instruction focused on goal-directed behavior and perseverance through challenging tasks, and BAU (control). Results revealed advantages for the embedded EF condition. The embedded EF condition outperformed BAU on the NAEP outcome, while the core program alone did not (ES = 0.56 vs. 0.10) and with the embedded condition outperforming BAU on the multiplication outcome, while the core program alone did not (ES = 0.78 vs. 0.26). On Ordering fractions, both interventions outperformed BAU (ES = 1.76 for the embedded condition and 1.29 for the core program alone). Most interestingly, on Word Problems (WPs), the embedded condition outperformed BAU, with an ES of 0.78. Although the main effect for the core program alone versus BAU was also significant, pretest WP performance moderated the effect of the core program versus BAU (not the case for the embedded condition vs. BAU). This moderation indicates that the WP outcome was consistently higher for the core program than BAU. However, although the correlation between pretreatment and posttreatment score was not significant, the correlation between pretreatment and posttreatment score was significant in the core program alone. This suggests that students responded more adequately to the core program if their pretest fraction word-problem performance was stronger. The fact that this moderation effect was not significant for the contrast between the embedded intervention versus BAU shows that the EF component protected students against the effects of pretest skill in determining responsiveness to intervention.
Presentation 3: *Differential Effects of Two Reading Interventions on the Reading Comprehension of Students at Two Grade Levels with Different Attention Ratings*

**Presenter(s):** Doug Fuchs, Vanderbilt University,

**Additional author(s) not presenting:**

**Description:** Doug Fuchs and colleagues are engaged in a 5-year effort to develop a program to be used to strengthen at-risk students' reading comprehension (RC) in informational texts. The program is comprehensive in 2 ways: It consists of many before-, during-, and after-reading strategies; and it includes working memory (WM) training to strengthen children's related cognitive processes. In this session, Fuchs will describe a study conducted with 3 treatment groups and a control group. The first 2 treatments included RC instruction-RC alone (hereafter, 'COMP') and COMP with embedded WM training (hereafter, '[WM]COMP'). A third treatment consisted of WM only. Hence, this study in part explored the value of domain-specific ([WM]COMP) vs. domain-general (WM) training. It was conducted across 2 years in grades 3-4. 198 children came from 91 classrooms in 19 schools. Third and fourth graders performing, respectively, at the 19th and 14th percentiles on the CELF, were randomly assigned by grade and school to the 4 study groups. The 3 treatments were conducted in 42 sessions 3x per week for 14 weeks. They were tutored 1:1 in 25 min sessions. Findings indicated no differences on an RC factor score between the COMP and [WM]COMP conditions. The two conditions were combined in subsequent analyses and, multi-level modeling indicated that children in the combined condition outperformed controls (ES = .26). This masked strongly differential performance at 3rd and 4th grades, with highly significant effects (ES = .53) at 4th grade. Students with poorest attention ratings performed reliably better on the RC factor score after either RC or WM treatment than similar control children.

**Discussion/Questions:**

1. In terms of mediators and moderators: How might such mediator and moderator analyses help inform thinking about intensive intervention?
2. What are the advantages and challenges of allocating alternative forms of intervention to subgroups of students with different initial achievement levels of varying cognitive profiles?
3. What are productive research opportunities for embedding cognitive, linguistic, or socio-emotional instructional components within direct skills intervention?
4. In terms of intervention on cognitively complex outcomes like reading comprehension or math problem solving: What types of changes should we expect?
5. What are ambitious but realistic outcomes to target?
6. How do we measure these outcomes reliably and validly in ways that provide guidance for treatment?
Panel Organizer(s): Ralph Ferretti, Educational Testing Service; Educational Testing Service; Steve Graham, Arizona State University

Panel Overview:
Argumentative discourse emerges with the onset of speech. Toddlers exhibit sensitivity to their caretakers' opinions and the social and moral rules that may be used to resolve their differences of opinion. Unfortunately, empirical evidence shows that children and adults often do not argue optimally. They may ignore relevant evidence that is inconsistent with their opinion, may be insensitive to potential criticisms, lack standards for evaluating their arguments, and fail to adapt their strategies to the communicative context.

These limitations are also evident in students' written arguments. For example, the 2012 NAEP Writing Report Card showed that only about 25% of students' argumentative essays are competent. Competent essays usually develop strong reasons and provide supporting examples, but the support is not always effective, and they often fail to consider alternative perspectives. Data such as these gave impetus to the Common Core Writing Standards, which expect that by 12th graders will write arguments that establish the significance of the claims and counterclaims, create a logical organization for the exposition of claims, reasons, and evidence, recognize the limitations and strength of the relevant evidence, and account for rhetorical considerations that impact their audience. These are daunting expectations given the extant evidence about the quality of students' written arguments.

The aforementioned findings have gained further significance in the context of discussions about students' preparation for a competitive workplace. The increasing importance of expertise makes clear the value of sophisticated literacy skills as children progress through the curriculum. Literacy and content area learning become inextricably interconnected, so academic progress increasingly depends upon the acquisition of highly specialized knowledge and skills that are often discipline dependent. The Common Core's emphasis on argumentative writing across the curriculum reflects this concern about disciplinary literacy.

Concerns about disciplinary literacy and the quality of students' written arguments have sparked research about the conditions that impact writing quality. Viewed as a problem-solving process, writing requires the use of self-regulatory processes to achieve the author's rhetorical goals. Constraints on the writer's capacities and processing resources motivate strategic writers to draw on their knowledge of argumentative discourse, the topic, rhetorical considerations, and critical evaluative standards to write arguments. In addition, skilled writers set goals that can be used to guide the writing process, and they devise strategies for managing the demands associated with planning, writing, and revising their essays. Novice and less skilled writers have been shown to benefit from instruction that provides strategies for regulating the writing process. These interventions often include dialogic interactions with the instructor or the writer's interlocutors, and have been used to support planning, composing, and revising arguments.

Computer-based tools have been designed to assess students' writing skills and to support instruction that target their argumentative writing skills. Argumentative essays are challenging to assess, especially when the assessment goal is to guide genre-specific instructional decisions and support student learning. As a result, teachers must often make judgments about essay quality that lack the precision needed to guide instruction. Recent advances in the design of supported-assessment and tutoring systems hold the promise of providing actionable information to teachers about students' argumentative writing.
The papers included in this panel describe empirical evidence about a range of malleable factors that influence self-regulatory processes and contribute to the development of students' argumentative writing skills. Methodological considerations associated with assessment and instructional processes will be discussed.

Presentation 1: *The role knowledge, skills, motivation, and strategic behavior in writing development*
Presenter(s): Steve Graham, Arizona State University
Additional author(s) not presenting: Kay Wijekumar, Karen Harris, Puiwa Lei, Amber Ray, Julia Houston
Description: A central tenet of the model of domain learning is that learning is shaped by fundamental cognitive and motivational forces. These catalysts include learners' knowledge, motivation, and strategic behaviors within a domain. The current study tested this proposition in the domain of writing at two time points (Fall and Spring) with 227 fifth-grade students (123 girls, 104 boys), examining if writing skills, knowledge, motivation, and strategic behavior each made a statistically significant and unique contribution to predicting writing quality and output on a persuasive writing task, after variance due to the other catalysts, reading comprehension, and gender were first controlled. With one exception, writing skills (handwriting fluency, spelling), knowledge (text structure knowledge, topic knowledge), motivation (self-efficacy, attitude towards writing), and strategic behaviors (approach to writing, quality of plans) each accounted for statistically significant and unique variance in predicting writing quality. The exception involved writing knowledge which did not make a unique contribution in the Fall, but did in the Spring when a topic knowledge measure was added. For number of words written, writing motivation and strategic behaviors accounted for unique variance in the Fall, and writing knowledge did so in the Spring. For the most part, these findings provided support for the model of domain learning as applied to writing, as both cognitive and motivational variables made separate and unique contributions to predicting developing writers' performance.

Presentation 2: *Self-regulated strategy instruction for basic college writers: Initial results from a Goal-3 project*
Presenter(s): Charles A. MacArthur, University of Delaware
Additional author(s) not presenting: Zoi A. Philippakos, Henry May
Description: Developmental, or remedial, writing courses are common in the USA, especially in two-year community colleges, yet little systematic research has studied their effects. In a prior project, we developed and evaluated curricula for basic college writers and conducted a quasi-experiment that found strong positive effects on quality of argumentative writing as well as positive effects on self-efficacy and mastery motivation. In this session, we present results from the first year of a new project to conduct a randomized control trial across multiple community colleges. In fall 2016, 11 instructors and 126 students participated; in spring 2017, 8 instructors and 83 students in a second college participated. In fall, strong positive effects were found for quality of argumentative writing. Results for reading comprehension and motivation will also be reported. The quasi-experiment in the prior project and the studies in year one of the current project investigated the effects of the curriculum on writing without use of sources. In the second year, research will be extended to instruction that introduces students to writing argumentative essays from sources. Students learn to write summary and response papers to published articles and subsequently to integrate those sources into their own argumentative essays. Results and challenges will be discussed.

Presentation 3: *Children's understanding of argument and the impact of goals on their persuasive writing*
Presenter(s): Ralph P. Ferretti, University of Delaware, Educational Testing Service
Description: Ninety-six 4th and 6th grade students wrote argumentative essays about a controversial topic under two different conditions. Students in the general goal condition were asked to write a letter to persuade an audience to agree with their position. Students in the elaborated goal condition were given the general goal plus explicit sub-goals based on elements of argumentative discourse. In addition, students in these conditions participated in scenario-based interviews that were designed to elicit information about their understanding of argument, the text structure of persuasive essays, and the argumentative indicators and elements that are used to signal and support their standpoint. Students' responses to the scenario-based interviews revealed that they possessed an inchoate understanding of the genre (including its text structure and argumentative indicators and elements) that was sensitive to their audience and alternative perspectives about the controversy. Furthermore, in contrast to students in the general goal condition, fourth- and sixth-grade students in the elaborated goal
condition produced more persuasive and elaborated essays that were responsive to alternative standpoints than those in the general goal condition. However, students' written arguments did not always fully reflect their nascent understanding of the genre and its conventions. The implications of these findings for argumentative writing instruction will be discussed.

**Presentation 4: We-Write: A Web-Based Intelligent Tutor for Supporting 4th and 5th Grade Teachers in SRSD Persuasive Writing Instruction**

**Presenter(s):** Kay Wijekumar, Texas A&M University  
Karen Harris, Arizona State University

**Additional author(s) not presenting:** Steve Graham

**Description:** We-Write - Persuasively combines SRSD and text structure strategy instruction in a teacher-managed, web-supported instructional approach to improve persuasive writing with fourth- and fifth-grade students. We-Write teaches students how to select, encode, and take notes from source materials; combine writing and self-regulation strategies with genre knowledge and elements to write logical, coherent, and compelling persuasive arguments using what they know and believe (learning to write); as well as how to use such writing as a tool for learning content material (writing to learn). Twelve fourth or fifth grade teachers and their students, in rural or suburban schools in the northeast or southwest, were randomly assigned to either business as usual or the We-Write condition. All schools came from states that had adopted the CCSS and had poor writing scores and served a population of students with at least 90% eligible for free or reduced lunch programs. We-Write lessons were implemented for 18 weeks.

An under-powered cluster randomized controlled trial was used to gather data about the efficacy of the We-Write intervention and focus group data collection was used to gather data about implementation challenges and solutions. Treatment effect and the associated standard error estimates were taken from the two-level random-intercept main-effect models (M1) with adjustments for students' pretest outcome scores, pretest levels, and gender. Effect sizes were also calculated based on adjusted treatment effect estimates (i.e., standardized adjusted differences between We-Write and control groups). Students whose teachers used the We-Write system made a larger gain than control students for both planning and essay quality. Students were actively engaged in both the teacher lessons and the computer lessons and reported high levels of efficacy in writing and computer attitude. Teachers and students noted that this approach was unique and was quite different from previous implementations of technologies for learning. Additional findings will also be discussed.

**Discussion/Questions:**

1. What potentially malleable factors contribute to the quality of students' written arguments?
2. How can assessment and instructional practices be aligned to support the development of argumentative writing?
3. What must be done to ensure that effective instructional writing practices are implemented by teachers?
PANEL 4: Single-Case Research Effect Size Estimation and Meta-Analysis: Issues and Application
Friday, Feb. 2, 2018, 10:15 a.m.-12:15 p.m.
Constellation A

Panel Organizer(s): Paul Yovanoff, Southern Methodist University

Panel Overview:
The panel consists of three presentations focused primarily on single-case research analytic methods and secondarily on study findings presented to exemplify methods. Gaining in popularity as credible and accessible experimental research methods, single-case research analytic procedures specifically are not sufficiently summarized for scientists and practitioners. While much of the content is published or in publication, some methodological issues are very current and discussed as such.

Presentation 1 (Kevin Tarlow, Texas A&M) is strictly about methods (design and analysis). Effect size estimation and meta-analytic procedures will be discussed in relation to design and measurement. Design constraints are identified as critical factors to be considered when choosing effect size and meta-analytic models, including moderator variables. Emphasis is placed on analyzing single-case studies using appropriate statistical procedures, and factors that render one procedure more appropriate than another.

Presentation 2 (Paul Yovanoff, Southern Methodist University) will illustrate the impact of design and measurement on estimation and interpretation of study-wise and overall effect size obtained through meta-analysis. The context of this research is an IES funded Goal 2 development grant Project Intensity (principal investigator Jill Allor). Specifically, the research design was multiple baseline across behaviors within case, which places unique constraints on analysis and interpretation. Secondarily, the research findings will be highlighted as evidence of the reading intervention for students with intellectual disabilities.

Presentation 3 (Erin Barton, Vanderbilt University) will report the procedures and findings from a meta-analysis of single-case research studies of Technology Aided Instruction and Interventions (TAII) identified as part of the National Autism Professional Development Project (Barton et al., in press). Between-case effect size estimation and meta-analyses including moderators to identify sources of effect will be described. This presentation is particularly important as it demonstrates clearly the advantages of skillful use of appropriate statistical procedures for evaluating moderator effects. As with Presentation 2, the results will be of interest to attendees with interests beyond methodology, particularly the effects of technology aided instruction and intervention for students with ASD.


Presentation 1: Current Procedures for Estimating and Combining Single-Case Research Treatment Effects
Presenter(s): Kevin Tarlow, Texas A&M Health Science Center
Description: Presentation 1 is strictly about methods (design and analysis). Effect size estimation and meta-analytic procedures will be discussed in relation to design and measurement. Design constraints are identified as critical factors to be considered when choosing effect size and meta-analytic models, including moderator variables. Emphasis is placed on analyzing single-case studies using appropriate statistical procedures, and factors that render one procedure more appropriate than another.

Presenter(s): Paul Yovanoff, Southern Methodist University
Jill Allor, Southern Methodist University
**Description:** Presentation 2 will illustrate the impact of design and measurement on estimation and interpretation of study-wise and overall effect size obtained through meta-analysis. The context of this research is an IES funded Goal 2 development grant Project Intensity (principal investigator Jill Allor). Specifically, the research design was multiple baseline across behaviors within case, which places unique constraints on analysis and interpretation. Secondarily, the research findings will be highlighted as evidence of the reading intervention for students with intellectual disabilities.


**Presenter(s):** Erin Elizabeth Barton, Vanderbilt University

**Description:** Presentation 3 will report the procedures and findings from a meta-analysis of single-case research studies of Technology Aided Instruction and Interventions (TAII) identified as part of the National Autism Professional Development Project (Barton et al., in press). Between-case effect size estimation and meta-analyses including moderators to identify sources of effect will be described. This presentation is particularly important as it demonstrates clearly the advantages of skillful use of appropriate statistical procedures for evaluating moderator effects. As with Presentation 2, the results will be of interest to attendees with interests beyond methodology, particularly the effects of technology aided instruction and intervention for students with ASD.

**Discussion/Questions:**

1. Will anticipating meta-analysis of a series of studies change the single-case research design? (Yes, number of observations, measurement of outcomes, and inclusion of covariates as moderators will be explicitly, not incidentally, taken into consideration.)
2. Is controlling for baseline trend statistically equivalent to controlling for baseline trend by design? (hmmm?)
3. As single-case research is expected of classroom teachers, what if any of these methods has practical value in implementation of RTI?
Panel Overview:
Open science is an umbrella term including various reforms in contemporary science with the intent 'to make academic research more transparent, collaborative, accessible, and efficient' (Friesike & Schildhauer, 2015, p. 277). In other words, open science seeks to improve the integrity, efficiency, and influence of science by making aspects of the research enterprise accessible and transparent. Although open science has become a buzzword and affects research in many fields, it has received relatively little attention in special education. We intend to start a conversation about what open science is, and whether and how it might contribute to advancing special education research.

The first presentation introduces the open science movement—its origins, aims, prominent research, and applications in special education. In reaction to concerns about contemporary scientific culture and the reproducibility of scientific findings, open science proposes to improve the transparency, openness, and reproducibility of science (Nosek et al., 2015). Likely the highest-profile endeavor associated with open science is the Reproducibility Project, in which independent research teams replicating 100 experiments in psychology reproduced the findings of only approximately a third of the original studies (Open Science Collaboration, 2015). We discuss to what degree conditions that spurred the open science movement (e.g., a culture that rewards high-profile publications, a bias towards statistically significant results, methodological flexibility) exist in special education. We then summarize findings from two applications of open science in recent special education scholarship: (a) a series of systematic reviews examining the prevalence, types, and findings of replication studies in the field (Cook, Therrien, & Coyne, 2016); and (b) special issues featuring studies with null findings (Cook & Therrien, 2017; Kratochwill et al., in press; Therrien & Cook, in press).

In the second presentation, we describe two open science initiatives that have been influential in other fields and could positively influence special education scholarship. Registered reports require that researchers register plans for conducting a study before conducting the research, including specifying all variables measured and data analysis procedures (Chambers, 2013). Researchers submit these plans to a journal, which are accepted for publication based on their (a) scientific merit and (b) ability to address the research questions regardless of outcome. To be published, researchers must simply conduct and analyze their research as proposed. This approach addresses issues related to reporting study findings selectively, bias towards significant findings, and 'p-hacking' to attain desired results. The second initiative, the Transparency and Openness Promotion (TOP) Guidelines (Nosek et al., 2015), consists of eight standards, each with three possible levels of implementation, that journals can adopt to increase transparency of published research. The TOP Guidelines currently have over 3000 journal and organizational signatories, but none from special education. We describe registered reports and the TOP Guidelines and how they might be applied in special education.

The third presentation focuses on open data, which is a contentious aspect of open science that involves researchers sharing data for the purposes of verification, transparency, and conducting additional analyses. At the Workshop on Data Sharing and Research Transparency at the Article Publishing Stage (co-sponsored by AERA and the National Science Foundation [NSF] in July of 2017), 50 journals editors and scholars in education and the learning sciences affirmed a commitment to (a) transparent reporting of research and (b) responsible sharing and use of data. We discuss the benefits (e.g., permitting other investigators to replicate data analyses and conduct alternative analyses, combining data from different data sets to conduct new analyses) and potential problems (e.g., issues about protection of participants’ anonymity, authorship, data integrity, cost) raised during this workshop and elsewhere related to open data.
In the fourth and final presentation, we discuss the interaction of open science and research funding, specifically from the perspective of the NSF. The NSF and other federal government funding agencies have considered issues related to data sharing and research transparency to build more robust bodies of evidence in education by implementing open science practices. A commitment to data sharing, replication, and reproducibility can foster more rigorous research that will form the foundation of high-quality science and powerful evidence. The NSF is committed to understanding the challenges and opportunities of data sharing, replication, and reproducibility in education research, and has developed a plan grounded in the realization that clear and open communication of research is central to promoting scientific progress. NSF funders have begun to grapple with some of the more pressing challenges, including protecting privacy; preparing researchers to share data; and rewarding those who take on replication research.

Presentation 1: Open Science and Special Education
Presenter(s): Bryan G. Cook, University of Hawaii
Description: We examine the open science movement—its origins, aims, and prominent research—and how it has been and might be applied in special education.

Presentation 2: Pre-registration and the Transparency and Openness Promotion (TOP) Guidelines
Presenter(s): David Mellor, Center for Open Science
Description: We discuss two initiatives related to open science that, although used in other fields, have yet to be applied in special education: registered reports and the Transparency and Openness Promotion (TOP) Guidelines.

Presentation 3: Open Data
Presenter(s): William J. Therrien, University of Virginia
Description: We consider the pros and cons of a prominent and contentious aspect of open science, open data (or data sharing), and recent advances in open data in related fields and professional organizations.

Presentation 4: Open Science and Research Funding
Presenter(s): Robert Ochsendorf, National Science Foundation
Description: In the final presentation, we discuss the implications of open science, and open data in particular, for funding research in special education.

Discussion/Questions:
1. Are open science initiatives needed in special education research?
   - What are the objections to open science?
   - What are the reasons for supporting open science?
2. What aspects of open science hold the most potential for advancing special education research?
   - Replication?
   - Data sharing?
   - Pre-registration?
3. Who (or what groups) might object to open science initiatives?
4. What are concerns about open science in special education research?
PANEL 6: Assessment and Intervention in Mathematics
Friday, Feb. 2, 2018, 10:15 a.m.-12:15 p.m.
Britannia/Cambria

Panel Organizer(s): Pam Stecker, Clemson University

Presentation 1: Considering Multiple Sources of Data When Adopting a Formative Mathematics Assessment
Presenter(s): Deni L. Basaraba, Bethel School District #52
Additional author(s) not presenting: Pooja Shivraj
Description: Technical adequacy and diagnostic efficiency of assessments is critical within a multi-tiered framework. In this study, we explore data from two formative mathematics assessments and one summative mathematics assessment for students in Grades 3-5, as well as input from teachers, to make an informed recommendation for mathematics assessment adoption.

Presentation 2: Unpacking the Black Box of a Core Mathematics Program: A Mediated Moderation Analysis
Presenter(s): Christian Doabler, University of Texas at Austin
Ben Clarke, University of Oregon
Additional author(s) not presenting: Brian Gearin
Description: Explicit mathematics instruction is known to facilitate instructional interactions. This study investigated whether there was an optimal ratio of student practice opportunities to teacher demonstrations during core mathematics instruction. Results suggest that a 3:1 ratio of student practice to teacher demonstrations increased mathematics achievement for kindergarten students with mathematics difficulties.

Presentation 3: The Development of Mathematics-Vocabulary Measures for Elementary Students
Presenter(s): Sarah Powell, University of Texas at Austin
Additional author(s) not presenting: Melissa Driver, Suzanne Forsyth
Description: Mathematics requires an understanding of concepts and procedures, as well as knowledge of the language of mathematics. We developed measures of mathematics vocabulary for use with grades 1, 3, and 5. Across grades, mathematics fluency and general vocabulary were significantly related to mathematics-vocabulary scores. With this poster, we describe implications for assessment and intervention.

Presentation 4: Impact Study of a Tier 2 Fractions Intervention for Struggling Fifth-Grade Students
Presenter(s): Robin Schumacher, Instructional Research Group
Additional author(s) not presenting: Madhavi Jayanthi, Russell Gersten
Description: Findings from an impact evaluation of a fractions intervention for fifth-grade struggling students will be presented. The session will also highlight key features of the intervention, such as use of the number line, Concrete-Representational-Abstract sequence for representing fractions, and opportunities for problem solving and providing explanations for mathematical solutions.
PANEL 7: Maintaining Scientific Rigor in Educational Research: Methodological Conundrums and Decision-Making
Saturday, Feb. 3, 2018, 8:00-10:00 a.m.
Constellation A

Panel Organizer and Discussant: Nathan A. Stevenson, Kent State University

Panel Overview:
In every research endeavor, scientists make hundreds of decisions, each of which impacts the scientific integrity of the study itself. And though there are well known standards of scientific practice (Gersten, et al., 2005; Horner, et al., 2005; Thompson, et al., 2005; Brantlinger, et al., 2005; Hodis & Hancock, 2016) to help researchers produce high-quality rigorous scientific evidence, there are also situations in which scientists are faced with choices for which there is no clear answer. Even the most meticulously designed studies may encounter situations that threaten to undermine the integrity of the scientific process. Research in social science is replete with examples in which the complex, unpredictable, and uncontrollable environments challenge researchers' abilities to limit confounds and produce scientifically defensible data.

The proposed panel will discuss situations in contemporary research that challenge common notions of quality scientific research and consider to what degree long held tenets of quality research are adequate. Panelists will share unique and illustrative scenarios across an array of topics in which researchers attempt to protect the integrity of the scientific process, while also considering the practical, political, and ethical implications of such work.

We begin with a presentation on the challenges of implementing applied research, including the pros and cons of applied vs. clinical research settings and teacher vs. researcher implementation. Treatment integrity will be a focus, with a discussion of variations in implementation by teachers, how that can be monitored, and the value of ensuring fidelity of intervention implementation during a study and how that does or does not lead to intervention sustainability.

For the second presentation, the challenges encountered conducting research on teachers' CBM data-based decision-making will be discussed. The session will begin with a description of scenarios in which research designs, methods, or analyses were changed in response to unexpected circumstances in the research. These scenarios will then be used to illustrate and discuss issues such as: (1) What drives (or should drive) decisions to change research designs, methods, or analyses? (2) How much relative importance do we place on different components of high-quality research, in our decision-making (e.g. sample size, random assignment, experimental control)? (3) In what way are decisions influenced by common decision-making heuristics and biases?

In our third presentation, the shortcomings of quantitative research and the ways in which the strength of research design may be bolstered using qualitative methods are discussed. We hear from a scholar whose research has extensively used quantitative methods, has begun to incorporate qualitative methods into research examining the effectiveness of a collaborative project with a state agency focused on improving postsecondary education outcomes for individuals with disabilities. Included, is a discussion on the need to ensure future researchers are trained in qualitative methods in order to address research questions with scientific rigor they may not anticipate seeking to answer after the completion of their doctoral training.

Finally, we conclude with a critical look at the inadequacies of traditional approaches to research on progress monitoring and ways in which creative approaches to research design and methodology may enable researchers to address long-standing gaps in research literature. This session describes the difficulty in evaluating the sensitivity of progress monitoring tools for behavior using established statistical analysis and how the use of single-case experimental design can be applied effectively across a variety of settings.

Ample time will be reserved for discussion. Audience members are highly encouraged to engage panelists in critical discussion based Presentation contents and the questions listed below.
Presentation 1: **Applied vs. Clinical Research: A Critical Look at Treatment Integrity**

**Presenter(s):** Erica S. Lembke, University of Missouri

**Description:** This Presentation discusses challenges in implementing applied research, including the pros and cons of applied vs. clinical research settings and teacher vs. researcher implementation. Treatment integrity will be a focus, with a discussion of variations in implementation by teachers, how that can be monitored, and the value of ensuring fidelity of intervention implementation during a study and how that does or does not lead to intervention sustainability.

Presentation 2: **Making Decisions About Research on Teacher Decision-Making**

**Presenter(s):** Christine A. Espin, Leiden University, The Netherlands

**Description:** In this presentation, we will examine challenges that were encountered while conducting research on teachers’ CBM data-based decision-making. The session will begin with a description of scenarios in which research designs, methods, or analyses were changed in response to unexpected circumstances in the research. These scenarios will then be used to illustrate and discuss issues such as: (1) What drives (or should drive) our decisions to change research designs, methods, or analyses? (2) How much relative importance do we place on the different components of high-quality research, for example, large sample sizes, random assignment, experimental control, in our decision-making? (3) In what way are our decisions influenced by common decision-making heuristics and biases?


**Presenter(s):** Jeremy W. Ford, Boise State University

**Description:** While calls for increased scientific rigor in special education research have included qualitative methods, a strong emphasis remains on quantitative research designed to establish causality. However, though establishing causality is essential for providing evidence of effective practices, such a goal is not the only identified purpose of scientifically based research. In particular, qualitative designs can be used to examine the ways practice affects individuals with disabilities in a specific setting and under specific circumstances. This Presentation describes how a scholar, whose research has extensively used quantitative methods, has begun to incorporate qualitative methods into research to examine the effectiveness of a collaborative project with a state agency focused on improving postsecondary education outcomes for individuals with disabilities. Included is a discussion on the need to ensure future researchers are trained in qualitative methods in order to address research questions with scientific rigor they may not anticipate seeking to answer after the completion of their doctoral training. Further, as some qualitative methods (e.g., interviews and observations) are commonly used practices in schools, this Presentation also discusses the need to appropriately train practitioners, and model such methods, as a way of increasing the implementation of science in schools.

Presentation 4: **Single Case Design and Progress Monitoring Research: Questions and Design Considerations**

**Presenter(s):** T. Chris Riley-Tillman, University of Missouri

**Description:** Despite psychometric assessment having a long research history, there has been relatively little focus on documenting validity, reliability, and sensitivity in relation to progress monitoring. While less of an issue when assessment is used for diagnostic or screening purposes this path of assessment research is critical for documenting the impact of intervention. Considering the rising importance of evidence based practice in the field of education, it’s critical that we can fully document the evidence base for progress monitoring assessments. This section of the panel will focus on the use of single case design as a method to research the sensitivity of behavior progress monitoring tools. While not the typical application of single case design, this methodology does provide some unique advantages in both applied and research settings.

**Discussion/Questions:**

1. To what degree do the current tenets of high-quality research in education provide adequate guidance for contemporary research in schools?
2. In what ways have the standards of scientific research evolved since 2005?
3. In the future what are the methodological challenges that must be considered to protect the integrity of social science research?
4. In what ways can we improve the quality of training for doctoral candidates to best handle the methodological challenges they will face in the future?
Panel Organizer(s): Stephanie M. Hammerschmidt-Snidarich, Center for Applied Educational Research and Improvement (CAREI), University of Minnesota Center for Applied Educational Research and Improvement (CAREI), University of Minnesota
Kathin E. Maki, Ball State University

Discussant: Sahank Varma, University of Minnesota

Panel Overview:
Each instructional minute is precious to both students and practitioners, underlying the importance of developing instructional strategies and interventions that maximize learning effectiveness, efficiency, and engagement. In the domain of educational research, the resources that are necessary to conduct studies of promising procedures are equally precious. Collaborations between relevant disciplines, such as between cognitive psychology and applied research in special education and school psychology, may be essential for making the most of available knowledge and resources. On one hand, cognitive psychology produces basic research that identifies the fundamental mechanisms and conditions that produce the greatest learning. On the other hand, applied researchers ideally leverage the results of this pure research to solve problems in, and share the perspectives of, real-world school contexts and critical variables therein. When knowledge from the respective areas is used effectively, such collaborations can inform the design of instructional strategies and interventions that are effective, efficient, and engaging for students while also using research resources effectively and efficiently.

Without intentional collaboration between disciplines, critical lines of research may proceed more slowly. There is the possibility of parallel research tracks, or procedures developed and studied that are potentially less optimal than they could be. Incremental rehearsal (IR) is an example of a practice procedure developed and researched by school psychologists (MacQuarrie, Tucker, Burns & Harman, 2002) that parallels the practice sequence expanded practice, developed and researched by cognitive psychologists (see Varma & Schleisman, 2014). This case represents, at least initially, a missed opportunity and perhaps a cautionary tale. The authors, both cognitive psychologists, posited that understanding the mechanisms for IR's effectiveness might have informed improvements to the procedures in the early stages of IR's development; also that cognitive research might have more relevance to applied researchers if variables that are important in applied settings such as 'time on task' are taken seriously as potentially critical to study (Varma & Schleisman, 2014). Taken together, this example illustrates how disciplines may stand to derive mutual benefit by 'blurring the line between pure and applied research in learning and memory' (Varma & Schleisman, 2014, p. 227).

This panel will present three different papers, each of which will present quantitative results from intervention studies to provide a platform for discussing the issue of collaboration between cognitive psychology and applied researchers. The interventions featured in the papers include (1) repeated reading, an oral reading fluency intervention; (2) incremental rehearsal, a flashcard technique; and (3) word sorts, a phonics intervention to help students develop word reading and spelling skills. Each intervention is widely used in practice, although the evidence base for each procedure varies in its breadth and quality. Panel members will each discuss one or more mechanisms for learning embodied in the intervention procedures that were used in the study. Parallel or related lines of research in cognitive psychology will be also be reviewed along with present or future collaboration opportunities. The discussant, a cognitive psychologist, will guide a discussion of the issues presented.

References:
Presentation 1: The Differential Effectiveness of Repeated Reading and Continuous Reading

Presenter(s): Kathrin E. Maki, Ball State University

Additional author(s) not presenting: Sarah R. Adams, Stephanie M. Hammerschmidt-Snidarich

Description: Reading fluency is a fundamental skill that predicts students' overall reading performance (Kim, Petscher, Schatschneider, & Foorman, 2010), and thus represents an important target for tier 2 reading intervention when students demonstrate inadequate oral reading rate and accuracy. Repeated reading (RR) and continuous reading (CR) are two interventions targeting reading fluency difficulties. However, intervention dosage for RR and CR has typically been based on standardized amounts of time, which is problematic because students at different skill levels are likely to read different amounts of text during the same time period, which may result in different growth rates (Hammerschmidt-Snidarich, Maki, & McComas, 2017). This Presentation will present a study that examined the differential effectiveness of RR and CR by standardizing the number of words read during each intervention session so students received the same amount of reading practice despite differences in their reading rates. The study included 40 participants in second and third grades demonstrating needs in reading fluency who were randomly assigned to receive the RR or CR intervention. Following five weeks of intervention, 38 out of the 40 participants increased their words read correctly per minute (WRCM). There were no differences between groups on post-test fluency or a broad comprehension measure. However, the RR group demonstrated significantly higher comprehension of passages read during intervention sessions. Readers with higher fluency scores at pre-test tended to make the most growth regardless of intervention group. Finally, students in the CR condition reported significantly higher levels of intervention acceptability than did students in the RR condition. Implications for reading fluency intervention theory, research, and practice will be discussed.


Presentation 2: Procedural fidelity and learning: The importance of student responses during word sorts

Presenter(s): Stephanie M. Hammerschmidt-Snidarich, ServeMinnesota Center for Applied Educational Research and Improvement (CAREI), University of Minnesota

Additional author(s) not presenting: Jennifer J. McComas

Description: Interventions tend to be more effective when implemented with higher levels of procedural fidelity (Noell, Gresham, & Gansle, 2002), commonly measured as the degree to which protocol steps were completed by the interventionist (adherence) or the amount of instruction/intervention provided (dosage). However, student responses, specifically the quantity or accuracy of those responses, may also impact intervention effectiveness due to the fact that some component of the response includes the underlying cognitive mechanism that leads to student learning. It is thus important to identify those critical mechanisms, and may also be important to consider and measure student responses as an aspect of fidelity that can impact intervention dosage. This study examined how the quantity and accuracy of student responses during a word sort activity (Bear, Invernizzi, Templeton, & Johnston, 2000; Zutell, 1998) were related to their learning. Two third grade students with inattention participated in the word sort activity under high-support (one-to-one) and low-support (independent) conditions. Visual analysis of results showed that students' quantity and accuracy of responding was higher under high-support conditions, and this in turn corresponded with higher word reading performance. Student responses were thus related to learning, suggesting that this could be an important variable for more precise and accurate evaluation of dosage and instructional strategy/intervention effectiveness. The importance of identifying and researching the critical mechanisms that promote learning in this and other interventions will be discussed, along with the notion of integrating measurement of student responses as an aspect of procedural fidelity.


Presentation 3: Examining Spacing Effect to Increase the Efficiency of Incremental Rehearsal

Presenter(s): Anne F. Zaslofsky, Minnesota Math Corps

Description: A considerable amount of research has been conducted in attempts to understand the critical components of drill procedures and increase their effectiveness. Early research indicated that interspersing known items within the drill task enhanced acquisition and retention of new items (Gickling & Armstrong, 1978; Gickling & Rosenfield, 1995). Subsequent research has focused on other factors as the potential causal mechanisms for increased learning due to repeated learning trials. For example, comparisons of ratios of known items within the learning task and the number of opportunities to respond (OTR) found that the latter was more closely linked to retention than the former (Burns, 2007; Szadokierski & Burns, 2008). Incremental rehearsal (IR) is a highly effective intervention that uses high repetition and a high ratio of known to unknown items with linearly spaced known items between the new items. Pavlik et al. (2008) hypothesized that narrowly-spaced practice would result in quick learning while items that are widely spaced would result in longer-term retention. The current study examined the effect of spacing by teaching vocabulary words to 36 fourth-grade students. Each student was randomly assigned to a widely-spaced IR condition (i.e., one unknown item, one known item, one unknown item, two known items, one unknown, three known items, and increase the number of known items presented each time by one) or an IR condition in which spacing increased exponentially (IR-Exp; i.e., one unknown item, one known item, one unknown item, two known items, one unknown item, four known items, and one unknown item, eight known items). The results indicated that the students in the study retained twice as much information with the widely-spaced IR than the IR-Exp condition, but the latter required half as much time. IR and IR-Exp were equally efficient, but IR continues to be superior to all other flashcard approaches in improving retention.


Discussion/Questions:
1. The question of what, exactly, is encoded in memory has received different answers in the cognitive psychology literature. Some theories posit that memories are distinct, whereas others propose that they overlap with one another. This has implications for why people make errors - either failing to retrieve the target memory, or incorrectly retrieving a non-target memory. Can cognitive psychology theories shed light on the kinds of errors that children in the three studies make?
2. The current studies find that increasing intervention dosage results in better learning. What mechanism explains this relationship? When dosage is increased, do students benefit because memories are simply 'strengthened'? Or does additional study time enable them to engage in 'deeper' processing of the material, attending to its meaning and interrelating new information to known concepts? Identifying the underlying mechanism is important because it informs the next round of intervention studies.
3. Some of the studies found that increased dosage is most helpful for higher-skilled individuals - those with higher pre-test scores or higher reading fluency. Such interactions are of obvious interest to applied psychology researchers working in schools. Can cognitive psychology shed any light on them? Some speculations are possible. Prior research has shown that (1) people with greater domain knowledge can use this knowledge ('chunks') to increase the efficiency of storage and processing in working memory; (2) people who have automatized a cognitive skill can perform it without requiring limited attentional resources; and (3) people with better general abilities (working memory, executive function) are able to engage in more complex processing. Can these mechanisms explain the interactions observed in the current studies? How might future studies evaluate when these mechanisms explain the effectiveness of some interventions for some children?
PANEL 9: Effects of Domain-General and Domain-Specific Cognitive Processes
Saturday, Feb. 3, 2018, 10:15 a.m.-12:15 p.m.
Constellation A

Panel Organizer(s): H. Lee Swanson, University of California Riverside

Presentation 1: Teaching Higher Order Thinking Skills Using Corgi
Presenter(s): Jose Blackorby, CAST
Additional author(s) not presenting: Ellen Schiller, Jan Bulgren
Description: To facilitate higher order thinking skills, we developed an intervention of enhanced secondary science and social studies units with Content Enhancement Routines, a Google App called CORGI, and associated professional development. The poster will share information about the DBIR process, the enhanced units, CORGI itself, and impact and implementation findings.

Presentation 2: Problems of Inattention Affect the Impact of Tier II Instruction
Presenter(s): Christopher Lonigan, Florida State University
Additional author(s) not presenting: Beth Phillips
Description: The purpose of this study was to determine the extent to which inattention impedes reading-related skill acquisition from Tier-II instruction. Results indicated that inattention affected the degree that children benefited from instructional activities; however, the pattern of results suggested a complex dynamic between inattention, type of instruction, and specific outcome.

Presenter(s): Peng Peng, University of Nebraska Lincoln
Jessica Namkung, University of Nebraska Lincoln
Description: The current study reviewed cognitive profiling studies on mathematics difficulties (MD). Results showed that compared to typically developing (TD) individuals, MD showed severe deficits in phonological processing and processing speed, and moderate deficits in short-term memory, working memory, visuospatial skills, attention, and executive functions. Moderation analyses showed that the MDRD group showed more severe cognitive deficits than the MD only group. Severity of MD related to processing speed deficits. Deficits in phonological processing and attention are more severe in younger individuals with MD. Deficits in processing speed and working memory are most severe in the numerical domain. Deficits in low-level cognitive skills are relatively independent from deficits in high-level skills. These findings, taken together, suggest the numerical-processing deficit and the cognitive deficits of MD are relatively independent from each other. MD is a discrete construct with heterogeneity reflected by MD subtypes and age.

Presentation 4: The Role of Working Memory in Word-Problem Solving Performance
Presenter(s): Pamela Seethaler, Vanderbilt University
Additional author(s) not presenting: Lynn Fuchs
Description: Students with mathematics difficulty (MD) respond poorly to word-problem (WP) solving instruction relative to typically developing peers. The purpose of this study was to evaluate the role of working memory (WM) training embedded within and separate from an individually administered tutoring program designed to remediate students’ skill with solving WPs.
**Panel 10: Reading Comprehension: New Research in Intervention and Assessment**

Saturday, Feb. 3, 2018, 10:15 a.m.-12:15 p.m.
Constellation B

**Panel Organizer(s):** Nathan Clemens, University of Texas at Austin

**Presentation 1: Identification of Nonresponders to Reading Comprehension Intervention: Should Different Measures Be Used for English-Learners and Non-English Learners?**

**Presenter(s):** Eunsoo Cho, Michigan State University  
**Additional author(s) not presenting:** Philip Capin, Greg Roberts  
**Description:** We examined the diagnostic accuracy and efficiency of different measures for identifying nonresponders to intervention in Grade 4 and the differences in diagnostic accuracy between English learners (ELs) and non-ELs using Oral reading fluency (ORF), Test of Silent Reading Fluency and Comprehension (TOSREC), Vocabulary and listening comprehension. Two criteria were used to identify nonresponders: final status and growth benchmarks. With final status benchmark method, ORF or TOSREC as a single predictor yielded good diagnostic accuracy for non-ELs (AUCs above .80) but not for ELs (AUCs = .66 and .71, respectively). Adding a vocabulary, but not listening comprehension) measure significantly improved diagnostic accuracy for ELs (AUCs above .79). However, none of the measures in univariate or multivariate model yielded acceptable diagnostic accuracy for both groups.

**Presentation 2: Is Early Reading Comprehension Instruction Too Difficult for At-Risk Students?**

**Presenter(s):** Eric Dion, Université du Québec à Montréal  
**Description:** Twenty-two second-grade classrooms (Montreal, Canada) were randomly assigned to a control or an intervention condition. In this last condition, teachers implemented a simplified form of peer-mediated reading comprehension instruction. Our findings show that this kind of instruction is highly effective with young students at risk of reading disabilities.

**Presentation 3: Teaching the Vocabulary of Comprehension: A Technology-Enhanced System to Enhance At-Risk 3rd Graders’ Acquisition and Application of Essential Vocabulary**

**Presenter(s):** Melissa Fogarty, Texas A&M University  
**Description:** This project developed, refined, and piloted an innovative, technology-enhanced learning system, called the Integrated Vocabulary of Comprehension (IVC) to build at-risk third-grade students' knowledge and application of the vocabulary of comprehension. Results from a randomized control trial will be presented.

**Presentation 4: Differential Effects of an Adolescent Reading Comprehension Intervention Based on Students’ Pre-Test Reading Skills**

**Presenter(s):** Eric L. Oslund, Middle Tennessee State University  
**Additional author(s) not presenting:** Nathan Clemens  
**Description:** In this presentation, we present findings that examined differential response in an adolescent reading comprehension (grades 6th-8th) intervention for students at the bottom 10% on the Gate MacGinitie Reading Tests-4th edition at pretest. Interaction effects demonstrated some differential benefit of treatment for the lowest performing students.
PANEL 11: New Designs for Research with Students who Struggle in School
Saturday, Feb. 3, 2018, 10:15 a.m.-12:15 p.m.
Britannia/Cambria

Panel Organizer(s): Greg Roberts, Meadows Center for Preventing Educational Risk, Meadows Center for Preventing Educational Risk

Panel Overview:
The panel will present information on three little-used research designs - propensity score matching (PS), regression discontinuity (RD), and sequential, multiple assignment, randomized trial (SMART) designs. PS and RD are appropriate in cases where randomized designs may not be feasible. SMART designs are used to evaluate adaptive interventions such as multi-tiered systems of support. All three research designs are increasingly recognized by IES and other funders as legitimate alternatives to randomized approaches. Further, the three designs may be particularly appropriate for research that involves groups of students with disability or at-risk for disability. The presentation will begin with a very brief overview of inference-making in research, experimental and quasi-experimental designs for making well-founded inferences, and the potential bias associated with different research designs, including experimental designs. The three main presentations will expand on this opening by providing details on PS, RD, and SMART designs. We will assume that participants have moderate levels of knowledge about experimental research, but only minimal information about the three designs that will be the focus for the panel. The presentations will be organized around ‘running examples’ from programs of research in which the presenters are or have been involved. A practical, hands-on approach will characterize the presentations, with plenty of opportunities for questions.

Presentation 1: Propensity Score Matching Models
Presenter(s): Nancy Scammacca, The University of Texas Meadows Center for Preventing Educational Risk
Description: Selection bias is a serious threat to the validity of findings from studies that use quasi-experimental designs. It occurs when the treatment and comparison groups are not equivalent on factors that might be related to the treatment effect, thereby confounding the study’s results. Propensity score models attempt to reduce selection bias through stratification or matching of participants in the treatment and control groups on key covariates that could predict membership in the treatment group and thus affect the validity of causal inferences about treatment effects. We will discuss how best to implement propensity score models in the context of research with school-based samples of at-risk students.

Presentation 2: Regression Discontinuity Design
Description: Regression discontinuity designs (RDD) are quasi-experimental designs accepted by the What Works Clearinghouse as evidence for effectiveness. Within RDD, assignment to treatment is based on relative standing on a continuous assignment variable. RDD is an option for prospective special education researchers because it allows for treatment based on academic need, mirrors treatment assignment within multi-tiered systems of support, and allows for treatment of all struggling learners-an important feature for school partners. However, traditional RDD models have not been utilized widely in special education research due to concerns about the accuracy and precision permitted by RDD statistical models. This talk will focus on methodological advances that may address some of these concerns.

Presentation 3: SMART Design
Presenter(s): Greg Roberts, The University of Texas, Meadows Center for Preventing Educational Risk
Description: Sequential, multiple assignment, randomized trials (SMRTs) provide data that enables the development of high-quality adaptive interventions. An adaptive intervention is characterized by sequences of discrete treatments that are determined by student response data, tailoring variables, and decision rules (MTSS is
an adaptive intervention). In SMART designs, each stage of the design addresses one of the decisions involved in the adaptive intervention. At each stage, all participants are randomly assigned to one of two or more treatment options. By iteratively randomizing participants, effectiveness at each stage of the intervention can be evaluated. A SMART design independently tests the tailoring variables and the intervention components in the same trial. IES is considering SMART designs for funding.

**Discussion/Questions:**
1. What factors should a researcher consider when selecting a research design?
2. What are the limitations of each design?
3. What are the strengths of each design?