Panel Organizer(s): Doug Fuchs, Vanderbilt University, American Institutes for Research (doug.fuchs@Vanderbilt.Edu)
Additional Panelists: Lynn Fuchs, Vanderbilt University, American Institutes for Research; Nathan Clemens, The University of Texas at Austin

Challenging Traditional Notions of Intervention in Reading and Mathematics

Wednesday, Jan. 31, 5:45-7:15 p.m.
Cosntellation A

Abstract: Questioning commonly held notions of instruction and intervention is vital in our commitment to advancing intervention science for students with learning disabilities. In this session, three panelists will present experimental studies that challenge traditional ideas of intervention in reading and mathematics.

Overview: The "science of..." conversations have invigorated educators' interest in evidence-based practices in reading and mathematics. However, as with any popular movement, these conversations risk a hive mind mentality whereby what the group decides is best practice becomes accepted as evidence-based fact, any skepticism about such "consensus" is discouraged. Unfortunately, some aspects of what becomes accepted as best practice lack empirical support, either because research findings are equivocal or because they simply have never been studied experimentally. Science represents the search for larger truths, where researchers are as interested in questions as they are in the answers to them. Questioning even passionately held notions of intervention is vital in our commitment to advancing the science of intervention for students with learning disabilities. In this session, three panelists will present experimental studies that challenge traditional ideas of intervention in reading and mathematics.

1. Studies with students who experience comorbid reading and math difficulty focus on the effects of intervention in one domain without regard for their co-occurring needs. Providing multiple interventions is challenging for schools given limited time and resources, and because reading intervention usually takes priority over math intervention, many students are left without adequate services. This study's intervention conditions were designed to improve reading comprehension (RC) or word-problem solving (WPS) in ways that support transfer to the other domain. The connecting focus between domains was oral language. In this RCT, 334 second graders with comorbid RC and WPS difficulty were randomly assigned to the innovative RC intervention or the innovative WPS intervention or control. Multilevel analyses indicated effects favoring RC intervention over control on RC outcomes, and WPS intervention over control on WPS outcomes. Of greater interest, with explicit but limited instruction to support transfer to the other domain, reciprocal effects occurred in which RC intervention students outperformed control on WPS outcomes while WPS students outperformed control on RC outcomes. Mediation analyses provide insight into mechanistic processes by which effects occurred.
2. Three studies systematically explored the popular belief that phonological awareness (PA) training is a necessary part of early reading intervention. While extending PALS downward to kindergarten, we asked whether PA must be trained directly or addressed indirectly through code-based instruction. Study 1 contrasted teacher-led PA against a combined teacher-led PA + peer-mediated decoding (PALS-DE) vs. controls. In Study 2, we contrasted the combined PA+PALS-DE vs. PALS-DE vs. controls. In Study 1, PA + PALS-DE was superior to the two other groups in reading performance. In Study 2, the PA+PALS-DE group and PALS-DE group were superior to controls but equal in reading. In short, PALS-DE produced important reading outcomes, however the intensity of practice, task engagement, and immediate feedback present in peer-mediation component may have been the "active ingredient". Therefore, Study 3 contrasted four groups, a new peer mediated PA training program (PALS-PA), peer-mediated PALS-DE, PALS PA+DE, and controls. Results indicated you "get what you teach." Regarding PA measures, students in PALS-PA outperformed conditions without PA training (effect sizes: 0.20 to 0.55). On reading and spelling measures, students in PALS-DE performed significantly stronger than those who did not get PALS-DE (effect sizes: 0.98 and 1.25). We concluded that across a wide range of learners, intensive, explicit, and

systematic decoding instruction and practice, not PA instruction, was the "active ingredient" in effecting early reading outcomes.

3. Interventions for students with word reading difficulties have been better at improving pseudoword decoding than generalized real word reading. Students in grades 2 through 4 with significant word reading difficulties were randomly assigned to either (a) "Traditional" intervention that emphasized individual letter sounds, standard pronunciations of letters/letter combinations, and high-frequency words separate from decoding instruction; or (b) "Complex" intervention aligned with connectionism and statistical learning in which instruction targeted larger letter units, standard and alternative pronunciations of letters/letter combinations, and high-frequency words aligned with decoding instruction. Although not statistically significant, students in the Complex condition outperformed students in the Traditional condition on multiple measures of oral and silent word reading and grapheme-phoneme correspondence, including standardized (gs = 0.24 to 0.51) and researcher-developed (gs = 0.22 to 0.39) tasks, including several word types that were not included in the intervention. Contrary to traditional notions of intervention, more complexity and variability in the Complex condition may have resulted in greater generalization of word reading skills.

   Ample time will be allotted for discussion after each talk and the conclusion the session.

Questions:

1. In what ways do the findings diverge with commonly held beliefs about what evidence-based intervention conventionally looks like for students with LD?
2. What are the limitations of these studies and how might these limitations be addressed?
3. More generally, how strongly do findings influence practice and what circumstances affect whether they are more or less influential?
4. What new research directions do these studies inspire?
5. Most generally, how do we as a community of researchers strengthen the influence of science over ideology?

Panel Organizer(s): Sharon Vaughn, The University of Texas; Meadows Center for Preventing Educational Risk (srvaughn@austin.utexas.edu)
Discussant, if any: David Francis, The University of Houston; Department of Psychology (dfrancis@uh.edu)
Additional Panelists: Michael J. Kennedy, The University of Virginia; Elizabeth Swanson, The University of Texas; Jade Wexler, University of Maryland

Addressing the neglected role of Background Knowledge when designing interventions

Wednesday, Jan. 31, 5:45-7:15 p.m.
Constellation B

Abstract: Theoretical reading models across the development of reading (beginning through advanced) rely on background knowledge as a critical construct for understanding variation in reading comprehension. Yet, few reading intervention studies identify how background knowledge is integrated and built within reading intervention programs. Many programs rely on vocabulary as a proxy for background knowledge but inadequately address background knowledge fully. This panel includes 3 approaches to systematically building background knowledge within the design and implementation of the intervention. Relying on findings from pilot studies and randomized controlled trials, results of integrating background knowledge into interventions will be discussed. Discussant will address implications of these studies and also methodological and measurement issues with addressing background knowledge.

Overview: Four independent investigators focusing on improving knowledge acqusition for students with learning disabilities will present related studies.
The first set of studies will describe the impact of both efficacy and effectiveness studies examining PACT (Promoting and Accelerating Comprehension through Text) for students with reading difficulties in grades 4-8 providing measures of impact for knowledge building, vocabulary development, and reading comprehension.
The second set of studies will describe a knowledge building vocabulary routine informed by the DIME Model of reading. We will share findings from multiple studies that examine efficacy when the routine is included in a multi component reading comprehension intervention for students with reading difficulties included in the general education setting.
Using Multimedia to Boost Student Vocabulary and Background Knowledge
For students to succeed at the secondary level in content area courses they need to be familiar with key terms and concepts. However, a key component of understanding key terms and concepts is possession or development of ample background knowledge. For students with disabilities, English learners, and others who struggle, they often lack life, language, and educational experiences that lead to the rise and development of background knowledge. Multimedia offers a potentially powerful mechanism for educators to utilize to support the development of background knowledge and vocabulary capacity.
The third study presents data from a cluster randomized trial investigating three related and incremental approaches to multimedia vocabulary instruction and impact on student vocabulary performance, and perceived cognitive load. Eleven inclusive middle school science teachers from rural schools along with 635 total students (11.5% with IEP) with 100% free and reduced lunch participated. Students were randomly assigned within teacher blocks to watch a vocabulary vignette. Students completed immediate learning checks and perceived cognitive load measures following each of 30 vocabulary vignettes. Students who learned from the interactive vignettes scored significantly higher than their peers on the immediate quizzes and the posttest. Students also displayed higher levels of perceived cognitive load for terms on which they performed worse on short- and long-term measures of learning.
The last study will describe a content- and curriculum-agnostic multicomponent text-based knowledge building routine (i.e., PACT Plus) designed for teachers to implement across middle school Tier 1 settings. We will also explain how an adaptive intervention coaching model (i.e., AIM Coaching) was designed to support middle school teachers' implementation of PACT Plus. Next, we will share findings from a pilot randomized controlled trial revealing that implementing PACT Plus schoolwide, coupled with systematic supports for teachers (i.e., AIM Coaching), facilitated increased fidelity and dosage of instruction. Finally, we will use Diffusion of Innovation

Vaughn
Wednesday, Jan. 31, 5:45-7:15 p.m.
Constellation B

Theory to describe how implementation of the practices led to scale-up across one district and how collaboration with school partners is informing next steps with a focus on determining how the practices can be scaffolded to meet all students' needs.

Questions:

1. To what extent do you think background knowledge is malleable and what mechanisms might be consider when designing studies and developing interventions?
2. . What measures can be used to assess background knowledge?
3. How can we study the impact of background knowledge as a component of interventions?

Panel Organizer(s): Jessica R. Toste, The University of Texas at Austin (jrtoste@austin.utexas.edu)
Discussant, if any: Nicole Patton-Terry, Florida Center for Reading Research, Florida State University
Additional Panelists: Adrea Truckenmiller, Michigan State University; Andy Garbacz, University of Wisconsin-Madison

Studying Implementation to Improve Intervention Delivery for Students with Disabilities

Thursday, Feb. 1, 8:00-10:00 a.m.
Constellation A

Abstract: Though special education researchers are fundamentally invested in questions of implementation, successful implementation requires systematic study of methods that promote use of research findings. This panel brings together members of the Research Institute for Implementation Science in Education (RIISE) to discuss their intervention research focused on academic and social-behavioral outcomes for students with or at-risk for disability.

Overview: Though education researchers are fundamentally invested in questions of implementation, we have much to learn from the field of implementation science. The investigation of effective evidence-based practices is a first step, but successful implementation requires additional systematic study of methods that promote use of these research findings. This panel brings together members of the Research Institute for Implementation Science in Education (RIISE) to discuss their intervention research focused on academic and social-behavioral outcomes for students with or at-risk for disability. Each panelist will share how their ongoing projects have been guided by the field of implementation science. Panel members present various types of projects and implementation science constructs.

First, Garbacz will discuss research focused on the iterative refinement of family-school collaboration systems during middle school. Despite convincing evidence that school outcomes for students are enhanced when families and educators collaborate, authentic family-school collaboration remains largely elusive. Implementation science offers a framework for understanding barriers and leveraging facilitators to address intractable problems in education. He will present findings from two published studies that demonstrate how implementation science can be used to promote alignment and integration of family-school collaboration systems and practices in schools. The first study presents findings from a qualitative study that centers the perspectives of family members, students, and educators to develop feasible and effective approaches to collaboration for students in middle school with emotional and behavior concerns (Garbacz, Jordan, et al., 2022). The second study these findings to align and integrate family-school collaboration systems and practices in middle schools and presents implementation and outcome data that show improvements in parent-teacher relationships and student social and emotional outcomes (Garbacz, Kaul, et al., 2022). Implementation outcomes from the second study suggest a need for continual refinement of family-school systems and practices. Thus, as a final step, he will present preliminary findings from an implementation analysis that leads to a refined framework for family-school collaboration during middle school.

Next, Truckenmiller will discuss methodological opportunities related to the potential for using decision trees to promote implementation of data-based decision-making. To make instructional decisions, practitioners consider more than one piece of information. Reading researchers (and other areas of education) have wrestled with ways to statistically "weigh" research-based features of reading to facilitate uptake by practitioners. In this presentation, she will demonstrate how decision trees can facilitate uptake using an example from reading (LaLonde et al., 2023). Pre-service teachers instantly improved their graph interpretation with the use of decision tree. A major challenge with using decision trees in reading is that we have not empirically validated the criteria for branches of the decision tree nor chosen theoretically relevant data. Classification and regression tree (CART) is a nonparametric analysis that produces decision trees and empirically derived cut scores and is used in other fields to facilitate implementation. She will present one published (Barrett et al., 2023) and two preliminary CART analyses in reading and writing to discuss the potential utility for facilitating implementation as well as limitations and need for more research. In the first preliminary analysis, she evaluates the contribution of miscues in CBM-R and their theoretical and practical importance. In the second, she evaluates a decision tree of students' writing development at the word, sentence, and discourse levels.

Finally, Toste will share findings from a systematic evaluation of the usability of a reading intervention for upper elementary students. Word Connections is a supplemental, targeted multisyllabic word reading intervention that has been tested with students identified as with or at-risk for reading disability. Findings have demonstrated positive effects (Toste et al., 2017; 2019; Filderman & Toste, 2022) and Word Connections has been rated by the What Works Clearinghouse as a program with "Promising Evidence" for effectiveness. This open source program has been downloaded over 16,000 in less than 12 months, which presents a unique opportunity to study usability. Usability testing allows for: (a) evaluation of characteristics likely to be predictive of adoption, (b) identifying usability issues to be addressed via program adaptation or redesign, and (c) understanding ease with which intervention is likely to be adopted and which components may impede implementation. Across fields, evaluation of usability is becoming increasingly routine (National Cancer Institute, 2017), but systematic usability procedures are rarely applied to academic interventions outside of the development stage. This presents a major barrier given that usability strongly influences implementation outcomes (e.g., teacher uptake, fidelity) that, in turn, impact student outcomes (Lyon & Bruns, 2019). She presents findings related to the characteristics of program users, degree with which each component being implemented as intended, adaptations made to program tasks (e.g., activities, content) or packaging (e.g., materials, dosage), as well as satisfaction and comfort with the program.

Questions:
(1) The field of implementation research focuses on outcomes, above and beyond intervention effects, to evaluate successful implementation (e.g., acceptability, adoption, appropriateness, feasibility, fidelity, penetration, sustainability, usability). Presentations in this session included some of those outcomes. What outcomes do you think are ripe for inclusion in intervention research focused on students with disabilities and/or their teachers?
(2) What are some challenges and potential solutions to including implementation outcomes in our intervention research?
(3) Intervention research is distinct from but can be aligned with implementation research. How is this distinction highlighted in presentations in this session?

Panel Organizer(s): Tasia Brafford, Texas State University (brafford@txstate.edu)
Discussant, if any: Elizabeth Swanson, The University of Texas at Austin
Additional Panelists: Gena Nelson, University of Oregon; Elizabeth Hughes, The Pennsylvania State University

Mathematics Vocabulary: The Foundation of Mathematics Competence?

Thursday, Feb. 1, 8:00-10:00 a.m.
Constellation B

Abstract: We focus on the role of mathematics vocabulary, specifically on student performance on tasks of mathematics vocabulary and the influence of mathematics vocabulary understanding with other mathematics competencies. We describe experimental and correlational work as the current state of the literature base and make recommendations for future mathematics vocabulary work.

Overview: This panel session will include three explanatory presentations in the area of mathematics vocabulary. These talks will provide an overview of the current literature base of instructional practices relative to and understanding of mathematics vocabulary across multiple grade levels. At the conclusion of the panelists' presentations, Dr. Elizabeth Swanson will serve as a discussant prior to audience questions and comments. This overview highlights critical aspects of each presentation and questions that may be of interest for discussion. In the introductory talk entitled, "Does Vocab Matter? Exploring Relationships Between Vocabulary Use and Math Writing," Elizabeth Hughes will describe a study evaluating effects of mathematics writing strategy instruction for students in Grades 4, 5, and 6. The intervention lasted two weeks and taught students to solve and explain mathematical reasoning for word problems using a targeted strategy. Students scored significantly higher on mathematics vocabulary use on post assessments than on preassessments. These findings were consistent across grade levels. Vocabulary use had a strong correlation (i.e., $p > 0.5$) with scores on writing focus, content, organization, and mathematical reasoning on pre and post writing samples. Mathematics vocabulary use had moderate correlations ($0.5 > p > 0.3$) with use of visual representations and accuracy of computations on post writing samples, but not prewriting samples. Full experimental and correlational findings will be shared.
In the talk entitled, "Exploring Mathematics Vocabulary in a Second Grade Whole Number Intervention," Gena Nelson will discuss Whole Number Foundations Level 2 (WNF-2). WNF-2 is a 60-lesson, second grade Tier 2 mathematics intervention program designed for students at risk of mathematics difficulties. We present an overview of the design and development of WNF-2, with a focus on program features that enhance students' opportunities to learn and apply mathematics vocabulary. We also overview a brief measure intended to assess key Grade 2 mathematics vocabulary concepts. Then, we present preliminary results from a small pilot of the WNF-2 program with approximately 150 students (75 who received WNF-2 and 75 who received business-as-usual control). Specifically, we investigate the relation between mathematics vocabulary and other math competencies such as computation, concepts and applications, and word problem solving. Discussion will focus on the role of mathematics vocabulary and effective assessment of this construct as it relates to multi-tiered systems of support.
In the final talk, "Teachers' Perceptions and Knowledge of Key Mathematics Vocabulary," Tasia Brafford will present on a currently ongoing study examining elementary teachers' understanding of key mathematics vocabulary terms. Elementary teachers (kindergarten - Grade 4) were first asked to identify and define essential vocabulary terms for their grade level. Specifically, teachers were first asked to identify between five to twenty vocabulary terms for their grade level and then asked to define each term. After this initial data collection, we will ask teachers to select between the teacher-created definitions and definitions from district-approved curricular guidance (i.e., textbooks, online curriculum resources). Descriptive analyses and teacher-selected vocabulary terms and definitions will be provided and described in detail.
Across each of these talks, researchers will describe the approach to vocabulary instruction or understanding, including the alignment between evidence-based practices approaches to vocabulary instruction and implementation of these practices. In addition to questions from the audience participants, the panelists will present questions regarding the future of mathematics vocabulary instruction research and findings related to practitioners' use of mathematics instruction strategies.

Brafford
Thursday, Feb. 1, 8:00-10:00 a.m.
Constellation B

Questions:

1. There are a variety of domains of mathematics vocabulary terms, such as geometry and algebraic understanding. Should educators and/or researchers focus on these domains individually?
2. Given the logistical restraints, what are the best assessment practices for evaluating one's mathematics vocabulary knowledge?
3. Many educators use explicit mathematics vocabulary instruction for students who may be experiencing difficulties in mathematics. Should these practices continue to be the focus of intervention work or should these practices be intertwined in core mathematics instruction?

Panel Organizer(s): Alyson A. Collins, Texas State University (alysonacollins@txstate.edu)
Stephen Ciullo, Texas State University (ciullo@txstate.edu)
Discussant, if any: Steve Graham, Arizona State University (steve.graham@asu.edu)
Additional Panelists: Gustaf Bernhard Uno Skar, The Norwegian Centre for Writing Education and Research (The Writing Centre), Norwegian University of Science and Technology

What is the 'Write' Way Forward? Considerations for Teaching Writing Effectively

Thursday, Feb. 1, 8:00-10:00 a.m.
Britannia/Cambria

Abstract: Researchers present four studies investigating effects of explicit and incidental approaches to teaching writing. Findings underscore effective and less effective instructional practices, with some evidence suggesting special and general educators utilize approaches that yield minimal effects on student outcomes. Discussion focuses on needs in teacher development and future writing research.

Overview: Outcomes on the National Assessment of Educational Progress (NAEP) suggests a need to improve students' writing achievement given decades of poor performance (National Center for Educational Statistics, 2012). Consequently, there is concern that students, particularly those with disabilities, do not attain the writing competency needed to write effectively in school, their personal lives, or the workplace. Teachers are responsible for ensuring students acquire this competence. Therefore, researchers must identify effective practices (as well as less effective ones) for teaching writing to facilitate teachers' access to practices that are beneficial to students. Four studies in this panel will compare and contrast effects of widely used practices.

Study 1 Researchers examined the effectiveness of a 'writing is caught' approach with young writers in Norway. This method assumes that writing competence is acquired naturally through use in meaningful contexts. This 2-year longitudinal randomized control trial (RCT) examined if increasing first-grade students' opportunities to write in various genres and for different audiences improved their writing quality, handwriting fluency, and attitude towards writing. Data was collected from 942 students in 26 schools randomly assigned to the experimental treatment, and 743 students in 25 schools in the business-as-usual (BAU) control. Experimental teachers in Grades 1-2 implemented 40 supplemental activities designed to increase students' purposeful writing. Results indicated increasing students' writing over two years did not yield statistically significant differences in writing outcomes relative to a BAU condition.

Study 2 This meta-analysis investigated the extent to which writing interventions are effective on writing outcomes (e.g., quality, spelling) for students in Grades K to 5. Researchers applied rigorous systematic search methods to locate studies. Inclusion criteria were: (a) participants in Grade K to 5, (b) investigated a writing intervention, (c) included one writing measure, (d) used RCTs or quasi-experimental designs with pretest, and (e) reported in English. Reliability of screening and coding exceeded 92% and 80%, respectively. Results identified 377 eligible studies that included 2,068 ESs. Robust Variance Estimation (RVE) models revealed that writing interventions, on average, have large effects on outcomes of genre elements (ES = 0.89) and organizational processes (ES = 2.14). Conversely, on average, smaller effects were reported for mechanics outcomes (spelling ES = .41) and conventions (ES = 0.33)

Study 3 This meta-analysis extended Study 2 by examining the effectiveness of writing interventions in improving the writing and reading of students in secondary school. Researchers examined published and unpublished writing interventions tested via experimental or quasi-experimental designs (with pretests). Across 406 independent comparisons, yielding 3,514 ESs involving 52,529 students, teaching writing had a positive effect on students' writing (ES = 0.47) and reading (ES = 0.22). Moreover, across all writing outcomes, statistically significant effects were obtained for more than 15 types of instruction including: comprehensive writing programs (including the writing process approach), strategy instruction, transcription, computer-assisted instruction, emulating good models of writing, feedback, goal setting, pre-writing, grammar, sentence construction, inquiry, peer assistance, and text structure (range of ES = 0.32-0.92).

Study 4 Researchers present a multi-cohort observational study of special and general educators who provide writing instruction to students with disabilities. Observations explored teachers' use of explicit and incidental

practices to examine differences between special and general educators' instruction. Researchers observed 182 teachers (94 general and 87 special educators with experience ranging from 4 to 11 years) using the Writing Instruction Observation Protocol-Revised (Authors, 2018). Items documented the presence (1) or absence (0) of explicit (8 items, e.g., stating objective, modeling) and incidental (6 items, e.g., discussions) instructional practices. Interobserver agreement was 81% to 91% across all items. MANOVA results indicated a statistically significant difference between special and general education teachers' use of explicit and incidental instructional practices (2 x 2, $F(2,62) = 4.13$, $p = 0.02$). On average, special and general educators utilized incidental practices ($M = 3.11$ and 2.50, respectively) more often than explicit instruction ($M = 1.97$ and 2.92). Multivariate regression analyses indicated statistically significant differences between the two groups of teachers, revealing less frequent use of explicit and incidental practices for special versus general educators ($b = -11.56$, $p < .001$ and $b = -9.80$, $p = .001$, respectively).

Discussion Findings from the four studies have important implications for how educators use writing interventions to improve outcomes for students with disabilities. Discussion will consider implications for using explicit and incidental approaches to teaching writing. In addition, discussion will identify areas needing attention in pre- and in-service professional development. Finally, the panel will discuss how to promote co-teaching models that enhance collaboration among teachers and promote more responsive instruction.

Questions:

1. Across the four studies, what results were particularly surprising and perhaps contradict assumptions of what educators may consider best practice in writing? 2. How can researchers contextualize these unexpected research findings for key stakeholders to facilitate changes in professional development approaches? How can researchers facilitate system-wide changes, such as adjustments to pre-service teacher education? What is needed to facilitate change at the micro and macro-level? 3. Given the findings presented from the four studies in this panel, discuss suggestions for: (a) future intervention refinement, and/or (b) areas for novel development and innovation projects. 4. What guidance should be shared with funding agencies (e.g., IES) about conceptualizing new research competitions to advance the field in writing? Given the critical need to improve writing outcomes for students with disabilities, how could innovative research be used to advance both research and practice?

References (if any):

Authors (2018) National Center for Educational Statistics. (2012). The nation's report card: Writing 2011 (NCES 2012-470). Washington, D.C.: Institute of Education Sciences, U.S. Department of Education. Retrieved from: https://nces.ed.gov/nationsreportcard/pdf/main2011/2012470.pdf

Panel Organizer(s): Michael Coyne, University of Connecticut (mike.coyne@uconn.edu)
Additional Panelists: Allison Gandhi, American Institutes for Research

Additional Authors Not Presenting: Jennifer Schnakenberg, Meadows Center for Preventing Educational Risk, The University of Texas at Austin; Kathleen Lane, University of Kansas

IES MTSS Research Network: Integrating Academic & Behavior Practices Across Tiers

Thursday, Feb. 1, 8:00-10:00 a.m.
Aurora

Abstract: This panel includes researchers from the four research teams that are part of the IES MTSS Research Network. Teams will share goals, updates, new findings, and reflections from their programs of research that target interventions and systems focused on reading, mathematics, and behavior supports within an MTSS framework

Overview: Presentation 1: Nathan Clemens, University of Texas at Austin research team, will provide an update, including new research findings, from a program of research evaluating the effects of integrating strategies focused on academic engagement within a mathematics and reading intervention intensification process for elementary students with academic difficulties. The goal is to identify and evaluate strategies that support students' academic engagement, a self-regulatory behavior that is directly tied to learning, that can be integrated within reading and mathematics interventions in efficient and cohesive ways. The research design includes a series of sequential, multiple assignment, randomized trials (SMART designs).
Presentation 2: Kathleen Lane, University of Kansas research team, will provide an update on a program of research, Enhancing Ci3T: Building Professional Capacity for High Fidelity Implementation to Support Students' Educational Outcomes. The Ci3T model was designed to provide a systems approach for schools to address students' academic, behavioral, and social needs in one coordinated model. Specifically, the Ci3T model blends the principles of response to intervention, positive behavioral interventions and supports, along with a validated social skills program. Ci3T offers a comprehensive, integrated, data-driven prevention model with structures for monitoring system- and student-level data to determine effectiveness in meeting system/school goals and to inform instruction for students. New findings from a randomized control trial will be presented.
Presentation 3: Allison Gandhi, AIR and Erica Lembke University of Missouri research team, will provide an update, including new research findings, on the development and validation of an Integrated academic and behavior MTSS fidelity rubric that's goal is to reliably and validly measure implementation of integrated MTSS and that can be used by schools and districts to guide implementation and by researchers to advance our understanding of the impacts of MTSS on student outcomes. The research team developed the fidelity rubric through an iterative process that builds off existing rubrics, draws input from a broad range of experts in the field and integrates feedback from a beta pilot test. The team will present findings from multiple rounds of administering and refining the fidelity tool.
Presentation 4: Michael Coyne, University of Connecticut research team, will provide an update on a program of research that is supporting schools implement both behavior and reading practices in grades K - 2 by strategically and integrating instruction and intervention practices in reading and behavior supports, rather than implementing separate, parallel practices. The presentation will share new findings from a randomized control trial evaluating integrated reading and behavior practices in Tier 1 classroom instruction Discussion: A Discussant will facilitate a converting that will address the following questions:
• What are challenges and opportunities that schools face implementing integrated academic and behavioral MTSS systems and practices in real world settings?
•What are consideration for researchers who are conducting studies focused on MTSS practices and systems?
•How can the activities and findings from the IES MTSS Research Network support researchers and practitioners interested in MTSS?

Questions:
•What are challenges and opportunities that schools face implementing integrated academic and behavioral MTSS systems and practices in real world settings?

•What are consideration for researchers who are conducting studies focused on MTSS practices and systems?
•How can the activities and findings from the IES MTSS Research Network support researchers and practitioners interested in MTSS?

Panel Organizer(s): Lisa Didion, University of Kansas (lisadidion@ku.edu)
Discussant, if any: Caitlyn Majeika, American Institutes for Research (cmajeika@air.org)
Additional Panelists: Marissa J. Filderman, University of Alabama; Sarah Benz, American Institutes for Research

An Exploration of Theoretical Perspectives of Professional Development and Teacher Outcomes

Thursday, Feb. 1, 10:15 a.m.-12:15 p.m.
Constellation A

Abstract: This panel explores teacher learning and professional development (PD). Presentations include (a) meta-analytic findings examining learning outcomes after PD; (b) teachers' intention to use data and mediation of knowledge and beliefs; and (c) knowledge outcomes after micro PD participation. Teacher learning theories, research design, and measure quality will be discussed.

Overview: Professional development (PD) is the primary method used to educate teachers on evidence-based practices that support their students in an increasingly complex and evolving education system. Improving and examining teacher outcomes (i.e., knowledge, skills, beliefs) should be at the forefront of PD intervention design. Due to the heterogeneity of PD designs, systematic reviews are unable to demonstrate moderating effects of PD components on teacher and student outcomes (e.g., Blank, 2009; Didion, 2020; Hillm 2013; Kennedy, 2016; Yoon, 2007). There remains a lack of consensus regarding how teachers learn and the mechanisms by which training impacts practice and ultimately improves student outcomes (Desimone, 2009; Guskey, 2002; Opfer & Pedder, 2011). An updated interpretation of the literature and theory is needed to comprehensively understand PD research. The present panel explores PD through the lens of teacher learning theories (i.e., the interaction of teacher knowledge, beliefs, and skills, and mediation effects of teacher outcomes on student outcomes) and the functions of the components of high-quality PD (i.e., intensity, relevance, collaborative learning). First, we present findings from a comprehensive, systematic review of PD research (Study 1). Then, we describe findings from a survey of teachers that uses structural equation modeling to explore mechanisms for teacher change (Study 2) and a PD study that demonstrates improved knowledge outcomes but deviates from the literature on PD intensity (Study 3). The first study presents findings from a comprehensive meta-analysis of 95 peer-reviewed experimental and quasi-experimental PD studies published between 1974 and 2023. Results examined effects from pre-k to 12th grade across academic domains and included students with disabilities. Preliminary findings indicate PD had a significant effect on teacher outcomes ($g = 0.54$, $p < .001$) and student outcomes ($g = 0.24$, $p < .001$). Analyses examining the mediation effects of teacher outcomes on student outcomes and moderating effects of high-quality PD components are underway. Findings may shed new light on complex issues about efficacious PD. Additional focus will be given to overall trends in the literature (e.g., special education teachers, research design, content, types of outcomes, quality of measures).

The second study provides an example of the interaction between teacher outcome variables. Specifically, the mediating effects of knowledge and beliefs on teacher intention to implement practices is explored through the lens of data training PD. In total, 221 teacher participants across seventeen states completed a survey through Qualtrics. Data-based decision-making (DBDM) knowledge was measured with a 24-item scale (McMaster, 2020). We measured the intention to use data ("I intend to keep data over the next 2 weeks") from a 15- item measure of the constructs of theory of planned behavior (Ruble, 2018). DBDM knowledge was strongly and positively associated with intention to engage in DBDM with a standardized path coefficient value of $B = 0.88$, $p < 0.001$. The relationship of training with intention was small but statistically significant with a standardized path coefficient value of $B = 0.08$, $p < 0.001$. The goal of our project was to understand the disconnect between training and practice by exploring the relative impacts of training, knowledge, and intention to use data in practice. Findings suggest knowledge may be a critical training target.

Third, we highlight a research-to-practice example from the National Center on Intensive Intervention (NCII). The mission of NCII is to build knowledge and capacity of state and local leaders, faculty and professional development providers, educators, and other stakeholders to support implementation of intensive intervention for students with severe and persistent learning and/or social, emotional, or behavioral needs using data-based individualization (DBI). In our third cycle of funding, NCII has become nimble in our approach to targeted technical assistance. In

doing so, we are able to become broader in our reach and audience. Through short (e.g., 75 minutes), topical, time-bound (e.g., 4 convening) community of practice (CoP; i.e., micro PD), NCII has increased participant knowledge about DBI across all audiences. The results from CoPs across stakeholder groups reflect this type of PD is as effective as sustained PD in increasing knowledge around DBI.

Questions:
Is it possible to have a PD model that can be individualized and intensified like we do students? How can we create a system to standardize teacher outcome measures? How can we improve PD research designs?

References (if any):
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Panel Organizer(s): Young-Suk Kim, University of California Irvine (youngsk7@uci.edu)
Additional Panelists: Shelley Gray, College of Health Solutions, Arizona State University; Mindy Bridges, University of Kansas Medical Center; Kate Cain, Department of Psychology, Lancaster University; Gina Biancarosa, University of Oregon; Rebecca Silverman, Stanford University

Additional Authors Not Presenting: Yucheng Cao, University of Tennessee at Knoxville; Rob Davies, Department of Psychology, Lancaster University; Marilyn S. Thompson, The Sanford School, Arizona State University; Maria Adelaida Restrepo, College of Health Solutions, Arizona State University; Jinxiang Hu, University of Kansas Medical Center; Mark Davison, University of Minnesota; David Weiss, University of Minnesota; Joseph DeWeese, University of Minnesota; Yukie Toyama, University of California Berkeley

Comprehension: Predictors, Assessment, and Use of Online Program

Thursday, Feb. 1, 10:15 a.m.-12:15 p.m.
Constellation B

Abstract: The panel focuses on multiple dimensions related to comprehension: 1) the causal role of content knowledge, 2) early predictors of later reading comprehension, 3) development of causal inference skill; and 4) usage of online K-5 online reading program on reading.

Overview: Overview In this panel, we address and discuss questions on different aspects of comprehension, including predictors, assessment, and use of online reading program. The panel is composed of four empirical papers that employ diverse approaches. Panelists will present findings on 1) the causal role of content knowledge, 2) early predictors of later reading comprehension, 3) development of causal inference skill; and 4) usage of online K-5 online reading program on reading.

Paper 1 We examined the relation of content/topic/domain knowledge (content knowledge hereafter) to reading comprehension and listening comprehension using a meta-analysis. The study was guided by the following questions: a) what is the relation of content knowledge to comprehension (reading and listening) and moderator of their relation (e.g., learner status)?; b) does content knowledge instruction improve comprehension and content knowledge and if so, what are moderators of their effects? Results from 162 studies showed that content knowledge was moderately related with reading comprehension (r = .44) and listening comprehension (r = .44). The magnitude of the relation did not differ by grade levels but the relation was strong whether the content knowledge was normed (versus researcher-developed). Instruction of content knowledge causally improved reading comprehension (effect size [ES = .30]), listening comprehension (ES = .27), and content knowledge (ES = 1.01). Effect sizes did not differ by treatment length or learner status (low performing vs. typically developing). Effects were larger for instruction that focused on activating knowledge compared to building knowledge. No differences in effects were found compared to reading instruction or vocabulary instruction.

Paper 2 This study examined oral language, cognitive, decoding, and home environment variables in PK and K, as longitudinal predictors of 6th grade reading comprehension. Children were enrolled in the Language and Reading Research Consortium and subsequently the Monolingual and Bilingual Reading Comprehension longitudinal study. This presentation includes 90 monolingual English-speaking children and 95 Spanish-English speaking children who had item level scores on the Woodcock Reading Mastery Test - 3 Passage Comprehension subtest in 6th grade. We fit separate grade and language group level Bayesian Generalized Linear Mixed effect models of response accuracy made by each participant to each question on the WRMT-3 PC. Results indicated that for the monolingual group in PK, higher scores on letter identification, auditory memory, and grammar were predictive of 6th grade reading comprehension. For the bilingual group, vocabulary, listening comprehension, and memory updating were most predictive. For monolingual English children in kindergarten, grammar, vocabulary, and listening comprehension were most predictive; whereas for the bilingual group, grammar, vocabulary, and auditory memory were the strongest predictors.

Paper 3 Causal inferences are inferences that establish textual coherence by making causal connections between units of information in a text (McMaster et al., 2012). In the current study, about 2,000 students from across the US in Grades 2 to 5 took MOCCA (Biancarosa et al., 2019) multiple times during the 2022-2023 school year. Data were

analyzed by predicting performance on the Measures of Academic Progress (MAP) test of reading using receiver operating curve analyses and by examining patterns of significant average and individual growth using multilevel growth models and adaptive measurement of change models. Results indicate that growth within each grade averaged about a quarter standard deviation with about 20 percent of students demonstrating psychometrically significant change, while cross-sectional differences between grades averaged from an eighth to two-thirds of a standard deviation depending on the grades compared. Results suggest that between second grade through fifth grade is a period of substantial growth in students' ability to make causal inferences during reading with the strongest growth occurring in the earlier grades. Practical and research implications will be discussed.
Paper 4 Supporting literacy is a major priority of K-5 education. Online personalized learning programs targeting reading have become common in many elementary school classrooms (NCES, 2021). Research on the effect of usage (i.e., the amount of use) of such programs is limited. The present study uses a large dataset (n = 249,474 students) to examine the relationship between usage of a common online personalized learning program, Amplify Reading, and literacy outcomes, including DIBELS Nonsense Word Fluency (NWF), Oral Reading Fluency (ORF), and Maze. Analyses compared the effect of no usage to usage across increments of time (e.g., > 0 - 5 hours, > 5 - 10 hours, etc.). Though effects for the early grades on NWF were consistent with a linear trajectory, effects for the upper grades on NWF and effects on both ORF and Maze were consistent with a nonlinear trajectory. Implications for research and practice are discussed.

Questions:
•What is the impact of content knowledge instruction on reading and listening comprehension, and are there any moderators of its effects?
•What are the key predictors of 6th-grade reading comprehension in early childhood (PK and K) for monolingual and bilingual children? What are the differences in predictors between monolingual and bilingual groups, and between PK and K?
•What are the patterns of growth in students' ability to make causal inferences across different grade levels and their relations to reading?
•How does the effect of program usage vary across different grade levels, and what does this reveal about its impact on literacy?

Panel Organizer(s): Allison Gilmour, American Institutes for Research (agilmour@air.org)
Additional Panelists: Roddy Theobald, Center for Analysis of Longitudinal Data in Educational Research at AIR; Emily Penner, University of California, Irvine

Additional Authors Not Presenting: Nathan Jones, Boston University

Leveraging Administrative Data to Address Special Education Staffing Challenges

Thursday, Feb. 1, 10:15 a.m.-12:15 p.m.
Britannia/Cambria

Abstract: Special education staffing challenges may impede the provision of effective services to students with disabilities. Administrative data presents an opportunity to directly study special education staffing, providing timely and policy-relevant results. In this panel, we present our research that uses administrative data to study different aspects of special education staffing.

Overview: Forty-five percent of schools nationally reported special education vacancies (NCES, 2022), and enrollment in special educator preparation programs is declining (Harper et al., 2022). In this panel, we present research using administrative data to address different components of special education staffing. Jones will begin the panel presenting his study of paraprofessional employment in Washington state. Penner will present a study of early childhood education (ECE) workforce turnover using data from a midsized western state. Gilmour will present her study of the special educator teaching quality and turnover using data from Tennessee. Theobald will present his study of financial incentives in Hawai'i to recruit and retain special educators. These studies illustrate how administrative data can be used to study one of the chief problems in special education impeding the provision of effective services: ensuring students with disabilities have access to well-trained personnel.

Paraeducators are an essential part of the education workforce, particularly in special education, and they perform essential daily functions. To examine trends across in the paraeducator workforce in Washington state, Jones and colleagues used descriptive statistics to analyze the composition and distribution of the workforce from 1996 to 2022, which included over 14,000 paraeducators in the 2022 school year alone. They found that the paraeducator workforce was more racially/ethnically diverse than that of special educators and that paraeducator-to-student ratios have decreased over time, but remained higher in schools with higher proportions of students of color. Most notably, turnover among paraeducators increased significantly since 1996, with workforce attrition peaking at a rate of 23% in the 2022 school year.

The educators providing intervention services for young children with disabilities offered through IDEA, the only federal ECE programming entitlement, comprise an important, large, yet understudied segment of the ECE workforce. Penner and colleagues used longitudinal administrative data across 11 school years for the universe of special education staff serving children with disabilities ages birth to four in a midsize western state (approximately 12,000 employee-year observations) to examine turnover patterns and predictors of turnover for ECE employees. They found about one in five employees left annually, growing to almost 40% when measured three years later. Paraprofessionals demonstrated the highest turnover rates; administrators the lowest. Most attrition was due to leaving public education, but approximately 5-7% left to K-12 annually. Age and salary both predicted leaving the ECE workforce.

Little is known about the quality of the special educators who move schools, switch to general education, or leave teaching. Gilmour examined the extent to which special educators moved schools between or within districts, left teaching in the state, or switched to general education and the association between teaching quality (as measured by value-added scores and observation scores) and the probability of special educator turnover using descriptive statistics and fitting multinomial logistic regression models to administrative data from 2012-13 to 2016-17 in Tennessee, including 1,130- 8,406 special educators, depending on the analyses. She found 7.36% of special educators moved to another school in their district, 2.56% moved to a school in another district, and 7.41% of special educators left teaching in TN. On average, special educators' probability of leaving teaching in the state declined as their value-added score increased, after accounting for the characteristics of teachers, their students, and their schools. Observation scores were similarly negatively associated with leaving, and with moving within or

between districts. Eight percent of special educators switched to general education positions, and the probability of switching was not associated with teachers' value-added or observation scores.
Theobald and colleagues studied a bonus policy implemented by Hawai'i Public Schools starting in fall 2020 that raised the salaries of special educators by $10,000. Using data from 115,085 position-year observations between 2014-15 and 2022-23 to fit difference-in-difference models, they investigated the effect of the bonus on (1) special educator shortages; (2) patterns of teacher attrition and movement between special education and general education; and (3) variations in effects between hard-to-staff schools in which teachers received additional bonuses and other schools. The bonus reduced the proportion of vacant special education teaching positions by 32% (1.2 percentage points), and the proportion of special education positions that were vacant or filled by an unlicensed teacher by 35% (4.0 percentage points). The bonus did not impact special educator retention; the impacts were driven by an increase in the number of general educators in the state who moved into special education positions. The effects of the bonus were largest in historically hard-to-staff schools in which all teachers also received "tiered school" bonuses of up to $8,000.

Questions:
1.What are the strengths and challenges of using administrative data to conduct research on special education staffing policies and practices?
2.How can researchers work with policymakers to support special education staffing?
3.What are the pressing concerns of intervention researchers, school leaders, and policy-makers related to staffing that could be studied with administrative data?

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Panel Organizer(s): Kristi L. Santi, University of Houston (klsanti@uh.edu)
Wendy Strickler, Mount Saint Joseph University (Wendy.Strickler@msj.edu)
Additional Panelists: Melissa M. Weber-Mayrer, Ohio Department of Education; Laura Rhinehart, UCLA; Sohyun Kim, UCLA

Additional Authors Not Presenting: Coleen Carlson, University of Houston

Research to Practice: Engaging Educators to Improve Reading Instruction and Intervention

Thursday, Feb. 1, 10:15 a.m.-12:15 p.m.
Aurora

Abstract: The presented projects are working to build capacity of elementary schools to identify early, accurately, and efficiently students with, or at risk for, dyslexia. Presenters will describe how they addressed the infrastructure needed to provide evidence-based interventions leading to improved reading achievement for students with, or at risk for, dyslexia.

Overview: The first project, AIIPaT, seeks to improve the reading outcomes of students with reading disabilities through the application of Improvement Science (IS) and the Concerns Based Adoption Model (CBAM) to build teacher, school, and district capacity in Texas to implement Multi-tiered Systems of Support (MTSS). The key dimensions of MTSS in reading are improved reading instruction, early identification of children at risk of reading failure, early intervention, and the use of assessment to monitor progress and measure outcomes. Despite knowledge of these keys being widespread among reading researchers and many teachers, reading problems persist, and schools struggle to achieve the goal of all students reading on grade level. The AIIPaT project will report on how findings of working three schools to strengthen Tier I instruction to help schools provide the right services to the right kids at the right time. The presenters will share how the use of Made to Stick principles help educators understand the Science of Reading. Finally, the results from teacher surveys and student assessment data will be shared during this presentation.

The Promoting Achievement in Reading Through Needs-driven Evidence-based Reading Structures (PARTNERS) Project focuses on early identification of students with or at risk of dyslexia in elementary school. This project is a collaboration of the Ohio Department of Education's Office of Approaches to Teaching and Professional Learning, Mount St. Joseph University's Reading Science Program, and the University of Cincinnati's School Psychology Program. The mission of the PARTNERS Project is to build the capacity of elementary schools to meet the needs of all students, including students with dyslexia, using a multi-tiered system of supports (MTSS) framework. The goals of the PARTNERS Project are to substantially improve the capacity of three elementary schools to implement an MTSS framework with fidelity to improve outcomes for all students, with focus on identifying and supporting students at risk for dyslexia through use of evidence-based screening and progress monitoring measures; supporting students using evidence based core instruction and interventions; and communicating results and collaborating with parents to establish and meet high expectations for students with or at risk of dyslexia. Preschool, kindergarten, and 1st grade teachers have engaged in ongoing professional learning and collaboration to complete a needs assessment (LAP-G) and focus work around identified systemic needs. Each buildings serves children living in poverty (85% of higher quality for free lunch) and has 1-3 classrooms per grade level, with approximately 15-20 students per class. The evaluation of the PARTNERS project is designed to be a comprehensive external evaluation examining both process (implementation) and impact (outcomes). Preliminary results will be shared.

The next project, Towards Early, Differential Intervention (TEDI) for Children with Dyslexia, seeks to identify students who are at risk of developing dyslexia/reading disability in three elementary schools in Los Angeles (N = 220). The purpose of this study is to 1) Determine the overall effectiveness of different systematic intervention programs for particular profiles of students identified at-risk of dyslexia; 2) Improve the training of teachers in multiple, evidence-based interventions; and 3) Increase the frequency and efficacy of elementary school personnel to understand literacy assessment results and to communicate these results to parents. Beginning in 2020, the TEDI research team at the University of California, Los Angeles (UCLA) screened elementary students using a digital

literacy skills screener, both in-person and remotely. Students identified at-risk of dyslexia were assigned to one of three dyslexia-risk subgroups and provided one of three different interventions targeted to their area(s) of literacy need. Students will be tracked using the digital screener and several paper and pencil assessments for two years. Students who are still struggling following the intervention may be identified with dyslexia. In this session, results from TEDI student assessments and TEDI teacher surveys will be shared. Further, dyslexia-risk subgroups and how these groups were determined across our three school sites will be described in detail.

Questions:

1. The AIIPaT discussion will center on the ability to use Made to Stick principle approach to implement change, starting one school at a time.
2. The PARTNERS discussion will center on assessment and identification in the context of response to instruction and early intervention, particularly the importance of addressing a systemic framework and tier 1 instruction.
3. The TEDI team will facilitate a discussion related to which data are necessary to identify students with dyslexia (e.g., decoding skills, rapid automatized naming performance, reading comprehension ability, summative and formative assessments, and teacher and parent surveys on their perception of student performance).

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Panel Organizer(s): Sarah Powell, The University of Texas at Austin (srpowell@utexas.edu)
Additional Panelists: Willa van Dijk, Utah State University; Stephanie Al Otaiba, Southern Methodist University; Michael Hebert, University of California-Irvine; Erica Lembke, University of Missouri; Leanne Ketterlin Geller, Southern Methodist University

Let's Talk Teachers! Can Professional Development and Coaching Impact Student Outcomes?

Friday, Feb. 2, 8:00-10:00 a.m.
Constellation A

Abstract: Beyond student-level interventions, boosting teacher knowledge may play a role in increasing student knowledge in reading and mathematics. Come join us to learn about teacher knowledge gaps, professional development in early reading and late elementary mathematics, and the role of teacher coaching in middle school mathematics.

Overview: In this panel, we will present four studies of teacher-focused efforts. In the first presentation, Willa van Dijk (Utah State University) and Stephanie Al Otaiba (Southern Methodist University) will discuss a survey administered to teachers. In order to understand what teachers understand about how to improve outcomes for students, one step is to describe teachers' general knowledge about implementing Multi-Tiered Systems of Support and specifically their understanding of how the Response to Instruction (RTI)/MTSS process works within their own school. Results from the Survey of Teachers' Knowledge about RTI Implementation administered 1000 teachers from 63 public elementary schools across 14 states suggest many teachers do not know much about RTI in their schools. In this study, they explored the status of "I don't know" answers by focusing on two different aspects. First, they examined if there are teacher characteristics that are associated with answering "I don't know." Second, we examined the location of the "I don't know" answer in relation to other answer options using Bock's nominal models. Understanding knowledge gaps can inform efforts to improve outcomes for students through designing impactful future professional development.

Speaking of professional development, Michael Hebert (University of California-Irvine) will describe teacher-focused efforts in reading. Many children in Grades K-3 did not receive adequate reading instruction during the COVID-19 pandemic (Goodrich et al., 2022). The purpose of the WORDS project was to accelerate reading development for K-3 students in rural schools through teacher professional development. WORDS included elements of practice-based professional development (e.g., McKeown et al., 2016), with workshops, coaching, afterschool tutoring, and teacher leadership training. The study included a regression discontinuity design and quasi-experiment. In this panel, they will share preliminary results from the quasi-experiment with 10 treatment and 5 control schools, but primarily focus on survey data related to teacher perspectives on the project. Teachers in 10 treatment schools (with 1,082 students) responded to Likert-type questions about the overall usefulness of WORDS, utility of components, and impacts on student learning. Teachers also responded to open-ended items. The discussion will focus on benefits, challenges, and appropriate expectations of impacting student learning through professional development.

With a focus on mathematics, in the next presentation, Sarah Powell, Kate Berry, and Megan Carroll (The University of Texas at Austin) present teacher student results from a professional development and coaching project called SPIRAL (SPecialized Instruction to Reach All Learners). SPIRAL educators provided small-group tutoring (in groups of 3 or fewer) to students who did not meet a minimum level of proficiency on the previous spring's high-stakes state-level mathematics test. SPIRAL included four professional development sessions and four coaching sessions about mathematics in the spring of the school year. The primary foci of the professional development included word-problem solving and using manipulatives to help students understand fractions. On a posttest survey, educators noted higher understanding of instructional practices, word-problem practices, culturally responsive practices, and assessment practices. At posttest, students demonstrated higher scores on a measure of computation and a measure of word-problem solving. These results show the initial promise of SPIRAL as a support system for educators who provide small-group mathematics tutoring to students.

In another mathematics-focused study with a deeper focus on teacher coaching, Erica Lembke (University of Missouri) and Leanne Ketterin Geller (Southern Methodist University) implemented STAIR (Supporting Teaching of

Algebra with Individual Readiness). For STAIR 2.0, they trained university-hired coaches to provide professional learning to middle school teachers in the areas of data-based individualization, assessment, evidence-based instruction, and decision making. The coaches then supported teachers as they implemented these practices with their students who have mathematics difficulties. Ongoing coaching sessions provided in person and virtually were structured around a coaching conversation form that prompts coaches and teachers to engaged in dialogue about best practices in teaching mathematics and supports teachers might need. Follow up resources such as short instructional videos were targeted and provided based on teachers' needs. In this presentation, they will provide data on which practices teachers feel most confident in implementing, which evidence-based mathematics practices are observed in coaching observation, and lessons learned as a result of coaching implementation in middle school in the area of mathematics.

Questions:
1. Regression discontinuity designs are helpful because they can eliminate the need for a control group that does not receive treatment. What are the pros and cons of this design, particularly when working with teachers?
2. What's the tipping point for professional development and coaching in terms of hours spent with teachers?
3. Is it realistic to expect that teacher-focused efforts diffuse to impact student-level outcomes without tangible student-level interventions in place?

Panel Organizer(s): Megan Rojo, University of North Texas (megan.rojo@unt.edu)
Jenna Gersib, Meadows Center for Preventing Educational Risk, University of Texas at Austin (jenna.gersib@utexas.edu)
Discussant, if any: Chris Lemons, Stanford University (chris.lemons@stanford.edu)
Additional Panelists: Jessica Turtura, Center on Teaching and Learning, University of Oregon; Ben Clarke, Center on Teaching and Learning, University of Oregon; Christian T. Doabler, Meadows Center for Preventing Educational Risk, University of Texas at Austin

Conceptual Replications in STEM Intervention Research: A Tale of Four Projects

Friday, Feb. 2, 8:00-10:00 a.m.
Constellation B

Abstract: Conceptual replications are pivotal in validating educational research findings. This panel will highlight four STEM intervention conceptual replication studies, comparing outcomes and contextual differences. The boons and challenges of replication research will be discussed, including working with diverse populations and in different geographical regions.

Overview: Conceptual replications can reveal key information regarding for whom and under what conditions interventions may be most beneficial. Findings from four STEM intervention replication studies are presented, representing over 600 K-2 students across the U.S. Each conceptual replication varied from their original studies in terms of geographic location, student populations, and intervention conditions.

First, the ROOTS study sought to replicate the efficacy of a Tier 2 mathematics intervention designed for kindergarteners with mathematics difficulties (MD). In this study, we varied the onset of intervention based on findings from a previous large-scale efficacy trial (Clarke et al., 2020). Two cohorts of students participated. The first cohort received the ROOTS intervention towards the beginning of the school year, while the second cohort received it in the second half of the school year. Stronger effects were found in the cohort with the earlier onset of the ROOTS intervention (Doabler et al., 2019). Based on these findings and because intervention onset was not systematically manipulated in the original cohorts, we designed the current replication to test the effect of intervention onset on student mathematics outcomes. The replication randomly assigned at-risk learners within classrooms to either intervention at the beginning of the year (BOY), middle of the year (MOY) or control. Results from the replication (analyses currently ongoing) will be shared and implications for intervention delivery will be discussed. Second, Fusion is a 60-lesson, Tier 2 first-grade mathematics intervention designed to build mathematical proficiency for students with MD. In an initial efficacy study (Clarke et al., 2023), researchers employed a partially nested RCT to randomly assign 459 first-grade students within 53 classrooms to one of three conditions: (a) Fusion intervention with a 2:1 student-teacher ratio, (b) Fusion intervention with a 5:1 student-teacher ratio, or (c) a no-treatment control. Findings from the initial study indicated significant, positive effects favoring the Fusion intervention. The initial study also reported students in the 2:1 Fusion groups made significantly greater gains than those in the 5:1 Fusion group. We conducted a conceptual replication to replicate the efficacy of Fusion with 240 first-grade students in a new geographical region. Relative to the original study, findings varied. When comparing the treatment groups to the control, results suggested positive effects on all outcome measures. However, differences between the two treatment groups based on group size were not found on the mathematics outcome measures. Implications for unpacking contextual differences between the original research and its replication will be discussed.

Next, Precision Mathematics (PM-1) is a targeted mathematics intervention for first-grade students with MD. PM-1 emphasizes problem-solving skills in measurement and data analysis and integrates early science concepts from the Next Generation Science Standards (NGSS, 2013). The initial trial (Doabler et al., 2019) took place in the northwestern U.S. and included approximately 100 first graders with MD. The researchers randomly assigned students to either PM-1 or business-as-usual (BAU). The intervention yielded positive, albeit nonsignificant, outcomes in four outcome measures of mathematics performance ($g = 0.03$ to 0.21) and one significant positive outcome ($g = 0.45$). The conceptual replication took place in a diverse southern U.S. border city to investigate the intervention's effects on emergent bilingual students with MD. We found treatment effects favoring PM-1 on two

of the four measures, including a curriculum-based measure for measurement and data concepts (g = 0.31) and a measure of expressive vocabulary (g = 0.40). Study results and implications for conceptual replications with diverse learners will be discussed. Lastly, we designed Scientific Explorers - Grade 2 (Sci2) to integrate validated principles of instruction (i.e., modeling of content, practice opportunities, and academic feedback) with NGSS concepts in an effort to equitably improve science outcomes for second-grade students. The original study compared the program to BAU science instruction in a cluster RCT and demonstrated evidence of promise from the Sci2 program (Doabler et al., 2021). Specifically, we detected significant effects on three of four science outcome measures (vocabulary, NGSS practices, NGSS content application) and a positive, nonsignificant effect on a distal measure of science content. In a recent replication using a cluster RCT (n = 196), we compared the Sci2 program to an inquiry-based version of the program, holding constant NGSS content, dosage, and PD (Gersib et al., 2023). Findings from replication displayed effects favoring the Sci2 program on all three outcome measures (g = 0.19 - 0.40). Together, these replicated findings signal strong promise of the Sci2 program. Variations across studies and corresponding implications will be discussed.

Questions:

The research presented within this panel emphasizes different geographical contexts between original studies and their replications. How crucial is the role of geographical contexts when intertwined with cultural and socioeconomic factors?

In our research, we observed varied results between the original studies and the replications. How should researchers think about interpreting differing results? Is the ultimate goal of conceptual replication research to understand how interventions work in different contexts and with different participating student samples?

To what extent should we balance what works for students with learning disabilities from underrepresented populations and tailoring interventions that are universally effective for all at-risk learners?

How have others interpreted results in light of a global pandemic? Are there particular boons and challenges that have emerged from intervention research since the onset of COVID-19?

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Clarke, B., Doabler, C. T., Turtura, J., Smolkowski, K., Kosty, D., Sutherland, M., Kurtz Nelson, E., Fien, H., & Baker, S. K. (2020). Examining the efficacy of a kindergarten mathematics intervention by group size and initial skill: Implications for practice and policy. The Elementary School Journal, 121(1), 125-153. doi: 10.1086/710041 Clarke, B., Doabler, C.T., Sutherland, M., Kosty, D., Turtura, J., & Smolkowski, K. (2023). Examining the impact of a first grade whole number intervention by group size. Journal of Research on Educational Effectiveness, 16(2), 326-349. doi: 10.1080/19345747.2022.2093299 Coyne, M. D., Cook, B. G., & Therrien, W. J. (2016). Recommendations for replication research in special education: A framework of systematic, conceptual replications. Remedial and Special Education, 37(4), 244-253. https://doi.org/10.1177/0741932516648463 Doabler, C. T., Clarke, B., Kosty, D., Kurtz-Nelson, E., Fien, H., Smolkowski, K., & Baker, S. K. (2019). Examining the impact of group size on the treatment intensity of a Tier 2 mathematics intervention within a systematic framework of replication. Journal of Learning Disabilities, 52(2), 168-180. doi: 10.1177/0022219418789376 Doabler, C. T., Clarke, B., Kosty, D., Turtura, J. E., Firestone, A. R., Smolkowski, K., Jungjohann, K., Brafford, T. L., Nelson, N.J., Sutherland, M., Fien, H. & Maddox, S. A. (2019). Efficacy of a first-grade mathematics intervention on measurement and data analysis. Exceptional Children, 86(1), 77-94. https://doi.org/10.1177/00144029198579

Panel Organizer(s): Kay Wijekumar, Texas A&M University (k_wijekumar@tamu.edu)
Additional Panelists: Philip Capin, University of Texas at Austin; Jill Pentimonti, University of Notre Dame; Shaui Zhang, University of Saint Joseph; Kacee Lambright, Texas A&M University

Inferencing and Reading Comprehension: Current Understandings of Instruction and Intervention

Friday, Feb. 2, 8:00-10:00 a.m.
Britannia/Cambria

Abstract: Supporting students' ability to comprehend text is an essential goal of literacy instruction. The research presented in this panel is important work in understanding what reading comprehension instruction is currently occurring in classrooms, how teachers can support comprehension through questioning, and the effects of instruction in inferencing on reading comprehension.

Overview: (1) Nearly fifty years ago, Durkin (1978-1979) conducted a seminal observation study of reading comprehension teaching during reading and social studies instruction provided by teachers in Grades 3 through 6. Durkin found that teachers infrequently taught reading comprehension (i.e., less than 1% of the instructional time was coded as including teaching reading comprehension). Since her study, we have gained substantial knowledge about reading theory and the science of teaching reading comprehension (Duke et al., 2021; Pearson & Cervetti, 2017). Still, however it is not clear how well this knowledge has translated to practice. This presentation will report findings from a systematic review of K-12 reading observation research. Based observational data from over 70 studies, we found the proportion of time dedicated to reading comprehension instruction increased relative to Durkin's study. However, many of the practices recommended for teaching reading comprehension were infrequently observed in the corpus of studies (e.g., text structure instruction, developing engaging/motivating contexts for reading, and providing text-based collaborative learning opportunities). These findings highlight the progress since Durkin's study, while also revealing the significant gap between the practices frequently recommended for teacher reading comprehension and the instruction that is occurring in K-12 schools.
(2) Within the shared book reading context, early childhood teachers' use of questioning may support children's language skills directly related to later reading comprehension abilities. When children answer questions, they make connections between information read aloud and related information, thus facilitating their ability to make inferences. In this study, researchers used the Systematic Assessment of Book Reading (SABR) a measure of teacher behaviors that support language/literacy development to understand the amount and type of questions teachers asked during shared book reading. Results revealed that teachers most frequently asked 'Wh-questions' (M = 23.78). Open-ended 'Why' and 'How' questions occurred at relatively low rates (M = 2.92). Children's use of questioning was also measured; results demonstrated that 96% of child utterances were comments and 4% questions. These results suggest that in order to elicit higher levels of verbal language from children, professional development should encourage teachers to increase amount of questioning in general, and, in particular, ask open questions more frequently. Additionally, encouraging children to ask questions more frequently could help build the skill of asking/answering questions about what they are reading - a skill that could facilitate later reading comprehension.
(3) Given the importance of inference generation for reading comprehension, knowledge of effective practices in teaching students to generate inferences is essential, especially for students with reading comprehension difficulties. The goals of this study were to, first, estimate summary meta-analytical effects of inference instruction on reading comprehension, and second, assess the extent to which effects differed by participant or instructional characteristics. A systematic search of the literature identified 45 experimental studies, which provided 69 independent samples and 123 effect sizes. Results suggest instruction in inferencing has a moderate ($g = 0.48$) overall effect on reading comprehension. Participant (grade, reading ability, & language status), instructional (group size, practice, type of inference, type of text, and text access), and outcome (measure type, assessed inferences) characteristics were examined as potential moderators. Only one significant moderator was identified, suggesting studies where students listened to the text read aloud had statistically significantly lower effect sizes than studies where students read the text independently. Future directions for research and concerns about alignment between instruction and assessment will be discussed.

(4) Bridging inferences occur when readers use prior sentence information to gain understanding of the currently-processing sentence and create a coherent mental representation of the text. These bridging inferencing skills play essential roles in generating main idea and summary statements and other reading comprehension tasks. The purpose of the current study was to examine the association of bridging inferences and reading comprehension skills in Grades 2 and 3 students. A total of 5,554 students from 380 classrooms and 67 schools participated in the research. Both researcher-designed measures and a standardized measure, Gray Silent Reading Test, were used to measure reading comprehension. We measured bridging inference skills using a researcher-designed measure that scores how well each student organizes events, detects essential details, and identifies the problem and solution in written responses. We used three-level hierarchical linear modeling (HLM) to examine how each of the reading comprehension measures were associated with the four bridging inference skills. We found that identifying details, problem identification, and solution identification were each significantly correlated with the GSRT. Therefore, we offer preliminary evidence that bridging inferences are essential foundations of main idea, summary, and general reading comprehension skills.

Questions:
1.How can we leverage knowledge of what instruction is currently occurring in classrooms related to reading comprehension in conducting future research?
2.What role does teacher knowledge play in the effectiveness of questioning strategies and in supporting question generation among young students? How can researchers support building teacher knowledge and question practices for read-alouds?
3.How can we support students' abilities to integrate comprehension strategies (e.g., inferencing, text structures, summarization) in order to understand a text? What research still needs to be done in this area?

Panel Organizer and Discussant: Audrey Sorrells, Texas Christian University; Alice Neeley Special Education Research and Services (ANSERS) Institute (audrey.sorrells@tcu.edu)
Additional Panelists: Miniyi Shih Dennis, Lehigh University; Endia Lindo, Texas Christian University

Additional Authors Not Presenting: Audrey Trainor, New York University

Learning Disabilities Research Equity: Identifying Contexts, Constraints, and Intersections for Future Study

Friday, Feb. 2, 8:00-10:00 a.m.
Aurora

Abstract: Calls abound for special education research equity and execution. Panelists present a cluster of studies that examine race, language, culture, and disability intersections related to diverse students' equitable access to effective intervention and outcomes. Feasibility and use of varied research methods help identify contexts, constraints, and intersections for future investigations.

Overview: Inequitable access to effective instruction has contributed to the marginalization and low achievement of many culturally and linguistically diverse (CLD) students with learning disabilities. There is an urgent need to augment effective instruction for these to reduce inequities and persistent disparities in their educational experiences, opportunity, and outcomes (Gamoran & Dibner, 2022). Students benefit from instructional practices that account for student diversity and the socially complex nuances in the communities in which they live; however, many educators have limited understanding of sociocultural contexts, racial identities, and ways to implement culturally responsive special education. This panel focuses on disability and intersections as race, culture, and language in the implementation and interpretation of intervention research. First 90 minutes, panelists present five relevant studies. The final 30 minutes allows for interactive discussion on equity, underscoring the findings and implications of this collective work. Feasibility and use of varied research methods that help identify contexts, constraints, and intersections for future investigations are discussed (e.g., Sorrells & Dennis, 2022; Trainor & Robertson, 2022).

Study 1: Clues: Using Generative Strategies to Improve the Science Vocabulary of Secondary English Learners with Reading Disabilities.

This study investigated the effects of the CLUES strategy, a generative vocabulary strategy, on the ability of four, low-income, urban high school students with low reading achievement to analyze and define unknown science terms relating to biology. The study further evaluated students' ability to maintain vocabulary gains over time and to generalize the CLUES strategy. A multiple probe across participants design (Tawney & Gast, 1984) was used to evaluate the effects of the CLUES intervention. Tau-U index was used to estimate intervention effect. The results showed that participants benefited from the use of the CLUES approach to define novel science terms and maintain their ability to use this strategy over time.

Study 2: Culturally Sustaining Practice in Special Education: What do we know; what gaps need filling?

This systematic review study examined the current state of evidence-based, culturally responsive practice in special education. An electronic search of 10 years of reports, 2011-2021, was conducted using EBSCOhost with Academic Search Ultimate, Education Source, ERIC, PsycARTICLES, and PsycINFO databases to identify current research of culturally responsive and sustaining practices (CR/SP) related to students with disabilities, resulting in a total of 867 studies retained for further examination after abstract level review. Descriptive characteristics and key outcomes of this research and area for further exploration will be presented.

Study 3: Ecological and Population Validity of Mathematics Interventions for Diverse Students with Low Mathematics Achievement: A Meta-Analysis

This meta-analysis examined the ecological and population validity of intervention research for students with low mathematics achievement (SWLMA). In this meta-analysis, although the effectiveness of interventions and instructional practices for SWLMA are at the heart of this study, we focus on examining the extent to which student characteristics and contextual factors, including intervention settings and interventionists' characteristics, can impact the treatment effects. A total of 44 studies published between 2005 and 2019 that met the inclusionary criterion and including 9,719 participants were included in this analysis. Our findings suggest, to improve the

external validity and generalizability of research, more detailed descriptions of participants and the sociocultural contexts of the intervention studies are warranted.

Study 4: Second Grade Teachers' Use of Academic Routines in Science Instruction for English Learners in Rural Communities

This qualitative study explored in-depth how second grade teachers use structured routines to teach reading and vocabulary of expository texts, what strategies teachers use to enhance student learning, and how these routines enhance teaching and promote student learning. The study was conducted in a public elementary school located in a small Southwestern rural school district with a highly diverse and high poverty student population. There was a total of 131 students in the larger study and 69 students were in the treatment classrooms. Teachers were observed to implement intervention with fidelity, many scaffolds were used in the classroom. Both teachers and students reported positive benefits as result of using routines; findings and recommendations are presented.

Study 5: Factors Associated with Postsecondary Success for English Language Learners with Disabilities: A Mixed Methods Exploration

This study includes secondary analyses of the NLTS 2012 transition experiences and post-school outcome data of multilingual learners with disabilities and qualitative explorations of these experiences and outcomes for high school and postsecondary students in New York City. Findings will be reported across several studies; discussion will consider the feasibility, use, and rigor of a mixed method approach to investigating intersections and equitable outcomes for ELs with disabilities.

Questions:

1. How do we build intervention research and theories of learning and development that foster equity in intervention research that includes CLD students with mild disabilities, learning disabilities, and learning difficulties?
2. How can the field move toward greater inclusion and respect for diversity in inquiry and research methods to investigate racial disparities and intersections of disability?
3. Should this kind of work rest solely on the shoulders and expectations of diverse researchers in intervention research? How can we leverage the expertise and resources that generally go elsewhere, to be more equitably distributed? How can we establish partnerships to sustain equitable research on diverse populations?

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Panel Organizer(s): Deborah Reed, Tennessee Reading Research Center, University of Tennessee
Additional Panelists: Kelly Williams, University of Georgia; Julie Owens, University of Tennessee

Data-Based Decision Making About Teachers: Measuring and Improving Literacy Knowledge and Practice

Friday, Feb. 2, 10:15 a.m.-12:15 p.m.
Constellation A

Abstract: Special education champions data-based decision making for improving student learning, but state policies do not reliably or consistently apply this approach to educators' learning. Presenters will share attempts to (a) gather trustworthy data on educators' literacy knowledge and practices and (b) use data to improve implementation of effective literacy instruction.

Overview: In an effort to improve students' literacy outcomes, 31 states and the District of Columbia have enacted laws and policies related to changing classroom instruction (Schwartz, 2022). However, these initiatives do not always move the needle (Garet et al., 2008). One possible reason is because measures of educators' knowledge and practices have been misaligned to the research base (Chase, 2006) or not developed to be psychometrically sound (Kelcey, 2011). In addition, there historically have been challenges translating research to practice in realistic environments (Solari et al., 2020), and these are not likely to be overcome by one-size-fits all state policies. This session proposes addressing these challenges with a data-based decision-making approach to educators' learning. The studies presented will examine the technical adequacy of a common instrument of teachers' dyslexia knowledge, fill a gap in the available data on secondary' teachers' literacy knowledge, and investigate ways to improve teachers' and principals' implementation of effective literacy practices.

The first presenter will report on the technical adequacy of a common instrument for measuring educators' knowledge of dyslexia, addressing the question: What is the factor structure and reliability of the DMF as designed with Likert-scale items? In light of studies that use similar items but different scoring approaches, the secondary aim of the study was to explore any differences in the technical adequacy when the DMF was scored in alternative ways. The responses of 1,141 preservice teachers were scored in three ways: polytomously with the original 4-point Likert scale, dichotomously as true-false, and dichotomously as though the options were multiple choice. An exploratory factor analysis suggested one-, two-, and three-factor models might fit the data, but at least one-third of the items needed to be removed due to low or cross loadings. Confirmatory factor analyses conducted with all scoring methods and dimensionalities suggested a one-factor model with polytomous scoring had the best fit to the data, but only 6 of the original 19 items loaded. All models that were explored demonstrated unacceptable internal consistency reliability (<0.70). Because no technically adequate version of the measure was identified, questions remain about basing policy on scores from these instruments.

The second presenter will share results from a pilot survey of secondary educators who provide specialized reading instruction or intervention. The primary purpose of this study was to identify the approaches, practices, and programs that teachers in grades 6 through 12 are currently using to provide specialized reading instruction and intervention to secondary students with reading difficulties and disabilities (RD). Data also were collected about teachers' knowledge of reading and dyslexia and teachers' perceptions of the challenges and barriers that affected their ability to provide specialized reading instruction and intervention in secondary settings. The final sample included 126 secondary educators from Indiana. Analysis of teachers' responses showed significant gaps in their knowledge about reading acquisition, characteristics and causes of dyslexia, and effective practices to support secondary students with reading difficulties and disabilities. Additionally, teachers reported that they were least confident in their ability to provide word-reading and spelling instruction, and reported they had not received adequate training about teaching students with RD in their teacher education programs. Implications for training pre-service and in-service educators who work with secondary students with RD will be discussed.

The final presenter will share data from a mixed-methods study investigating the impact of an implementation support strategy for principals during the rollout of an evidence-based writing intervention. The study investigated both the principals' (n = 9) and teachers' (n = 64) perceptions of the principals' (a) writing knowledge and support and (b) intervention knowledge and support. This presenter will report on the findings from the two adapted survey measures, Implementation Leadership Scale (ILS; Aarons, Ehrhart, & Farahnak, 2014) and the Principal

Support for Writing Instrument (PSWI; McGhee & Lew, 2007), as well as piloted open-ended questions on the challenges and barriers to implementation. Results of analysis indicated interesting discrepancies between principals' and teachers' perceptions, yet the gap in the discrepancies reduced after participating in the implementation strategy. The principals' knowledge, support, and participation in implementation strategy did not significantly impact teacher fidelity (overall 96%), but principals' intervention knowledge significantly ($B = 0.43$, $t(66) = 5.09$, $p < .001$) predicted an increase in fidelity. Qualitative analysis of the open-ended questions identified too many new initiatives being implemented simultaneously and the frequency of new writing initiatives as barriers to implementation.

Questions:

1. How do we shift researchers and policy makers from citing a research base for teacher knowledge measures to applying appropriate steps for verifying the technical adequacy of the instruments, especially when making adaptations to suit a study or initiative?
2. How can we examine the relationship between teacher knowledge and the methods and practices used in the classroom? Most importantly, do changes in level of knowledge lead to improved reading outcomes for students with RD?
3. How do principals' knowledge and level of support impact the implementation of a writing intervention? How can teacher and principal knowledge be utilized by researchers to support successful implementation of writing interventions?

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Panel Organizer(s): Deni L Basaraba, Amplify Education (dbasaraba@amplify.com)
Discussant, if any: Doris Luft Baker, University of Texas Austin (doris.baker@austin.utexas.edu)
Additional Panelists: Patrick Kennedy, University of Oregon; Lillian Durán, University of Oregon

Additional Authors Not Presenting: Danielle Damico, Amplify Education; Sandra Pappas, Amplify Education; Joanna Hermida, University of Oregon; Monica Zegers, University of California San Francisco; Cengiz Zopluoglu, University of Oregon

Early literacy development in English and Spanish: Profiles, risk, and measurement innovations

Friday, Feb. 2, 10:15 a.m.-12:15 p.m.
Constellation B

Abstract: We use a multifaceted approach to examine Spanish-English biliteracy development by exploring (a) profiles of students learning to read in Spanish and English, (b) conceptual scoring of a screening assessment that allows students to respond in either language, and (c) empirical predictors of reading risk in Spanish.

Overview: Spanish is the most common home language of English Learners in the U.S. and 80% of dual-language immersion programs provide instruction in Spanish and English. Consequently, there is a growing need to understand the skill development of students who are learning to read in both of these languages. We use a multifaceted approach to address this issue by investigating biliteracy profiles for students in Grades K-3, exploring the possibility of bilingual assessment via a screening assessment that allows for administration and student response in Spanish or English for providing an unbiased estimate of students' vocabulary knowledge, and using empirical data from a Spanish literacy universal screening assessment to derive an indicator of reading risk (including dyslexia) in Spanish that educators can use to help identify students in need of more intensive instructional support.

Multilingual literacy development in early elementary school: A latent transition analysis The current study investigates evidence for a range of developmental literacy profiles for multilingual learners concurrently exposed to literacy instruction in both Spanish and English. Leveraging an extant data set encompassing a cohort of approximately 75,000 students in kindergarten through Grade 3 from schools across the United States, the study utilizes latent transition analyses (Collins & Lanza, 2010) and measures of phonological awareness, letter name knowledge, word reading, and reading fluency administered in both English and Spanish at the beginning, middle, and end of the 2022-2023 school year to identify a range of reading profiles and investigate the trajectories of those profiles over time. Based on prior research, we anticipate identifying between three and six distinct learning profiles (Solari et al., 2022). Results have implications for nuanced instructional strategies and curricular developments that can be tailored to optimize the literacy of Spanish-speaking multilingual learners engaged in dual-language reading instruction across diverse educational settings.

Exploring prediction models for identification of Spanish reading risk

As the population of Spanish-speaking students increases in the U.S., mechanisms are needed to identify risk for reading difficulties in Spanish, particularly because reading difficulties - including dyslexia - in Spanish are characterized by different skills than in English (Davies et al., 2007; Soriano-Ferrer & Morte-Soriano, 2016; Suárez-Coalla et al., 2020). The purpose of this study is to identify which Spanish literacy screening measures explained the most variability in Spanish word reading. Approximately 1,300 students in Grades K-3 in 7 states were administered Spanish subtests of phonological awareness, letter name and letter sound knowledge, syllable decoding, word reading, reading fluency, and spelling. Multiple regression results indicate models with letter name and letter sound knowledge and word reading explained the most variance for Grades K and 1 and models with word reading and oral reading fluency explained the most variance in Grades 2 and 3. In addition, frequency data examining the profiles of performance across the composite score and subtests were used to validate the proposed models for Spanish reading risk.

Conceptual scoring of expressive vocabulary in a new bilingual universal screening measure

Nearly all states in the US have policies that support the universal screening of all children in grades K-3 for reading problems. Given that there is a growing population of children who speak languages other than English at home

there is a pressing need to develop assessments that provide a more fair and unbiased estimate of bilingual children's abilities. The conceptual scoring of both expressive and receptive vocabulary has been found to more accurately estimate bilingual children's overall vocabulary levels (Gross et al., 2014). Although this approach is becoming more common in diagnostic assessments (Anaya et al., 2017), it has not yet been widely explored in the context of universal screening and in the identification of risk for reading problems (Hwang et al., 2020). This presentation will describe the development of an expressive vocabulary screening measure that was developed to be administered in Spanish or English and allows for children to respond in either language. Implications for the use of Rasch modeling and satisfying the assumption of unidimensionality and a single unifying construct in measurement will be explored as well as future innovations in bilingual measurement design.

Questions:

1. How can these biliteracy profiles best be used to improve instructional effectiveness across diverse educational settings?
2. What measures in Spanish are the best predictors of reading problems in Spanish? What implications might this have for reading intervention in Spanish?
3. How can we continue to pursue innovations in bilingual measurement design that allow for multilingual children to draw on all of their conceptual knowledge in either language and that will more likely yield more accurate estimates of their overall ability levels?

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Panel Organizer(s): Matthew K. Burns, University of Florida (burnsm1@ufl.edu)
Additional Panelists: Nancy J. Nelson, Boston University; Michael J. Kennedy, University of Virginia, Jamie Day, University of Missouri; Alida K. Hudson, American Institutes for Research

Additional Authors Not Presenting: Hank Fien, Boston University; Lauren Artzi, American Institutes for Research; Katie Drummond, American Institutes for Research; Iliana Brodziak De Los Reyes, American Institutes for Research

Scaling Up Effective Core Literacy Instruction and Tier 2 Intervention In Middle Schools

Friday, Feb. 2, 10:15 a.m.-12:15 p.m.
Britannia/Cambria

Abstract: The panel will present four papers that apply rigorous designs and novel analyses to an understudied population. The focus will be on reading interventions and improving core instruction in reading and in content areas to enhance literacy outcomes. We will also discuss conducting large-scale research in the era of COVID.

Overview: Literacy, especially reading, is a critical skill for success in school and in the workplace (Fagella-Luby & Deshler, 2008). Multiple seminal reports have called attention to the stagnant state of literacy achievement among students in the middle school grades (Kamil et al., 2008; Vaughn et al., 2022). Quality literacy instruction in middle school provides the basis for motivation and success in reading and other content area courses (Pendergast, 2017) and college- and career-readiness standards require students in middle school to comprehend increasingly complex disciplinary texts in courses such as history, science, and social studies (ACT, 2017). Learning the content in courses such as social studies depends on a student's ability to read and comprehend challenging text (Heller & Greenleaf, 2007). However, adolescents are often only minimally prepared to independently comprehend such content (Swanson et al., 2015) and, by middle school, content-area teachers report that they direct little time toward teaching content reading or literacy skills within their courses (Chiodo & Byford, 2004; Ness, 2009). Thus, there is an increasing interest among practitioners and researchers in identifying instructional practices that can increase the literacy skills of students in middle school. In addition, there are calls among experts to better understand how the science of reading (SOR) is being applied in school settings as a first step toward developing a more robust science of teaching reading (SOTR: Kim & Snow, 2021).

The purpose of this panel will be to examine literacy instruction and intervention in middle schools. The four studies will present information about the landscape of instruction and specific approaches to enhance literacy outcomes for students in middle schools. Moreover, all the studies consisted of large-scale research with school or teacher as the unit of analysis. The panel will discuss the challenges of implementing large-scale research in the era of COVID 19.

The Landscape of Literacy Instruction and Intervention in Middle Schools

The first paper will present a summary of characteristics of literacy instruction implemented in 40 middle schools from six school districts to document the landscape of instruction. The study will also discuss intervention efforts and contextualize the data within the SOTR in adolescent literacy. Thus, the panel will begin with a snapshot of current practice.

Effects of 8th Grade Reading Interventions on At-Risk Student's Reading Achievement

The second paper will present data from 25 middle schools in Oregon who participated in the Middle School Intervention Project. The study examined the effect of the intervention programs that were selected and implemented by school personnel on student reading achievement, and the intervention and school contextual variables that modified the results. The study will present information about reading interventions commonly used at schools, how well they align with the current science, their effects on reading outcomes, and the contextual variables that modified the effect.

Effect of Multimedia Professional Development on Science Teachers' Vocabulary Instruction and Corresponding Learning Gains by Students with and Without Disabilities

The third paper will use data from two empirical studies to examine the effect of a multimedia professional development (PD) process that used instructional podcasts with embedded modeling videos for four key evidence-based practices for teaching vocabulary, access to customizable instructional materials that use the practices, and

ongoing coaching. A total of 21 science teachers across two studies were randomly assigned to treatment or business-as-usual control groups. Treatment teachers used significantly more evidence-based vocabulary practices with fidelity, and students made statistically significant gains on science content measures relative to comparison group peers, even among students with disabilities.

Pilot Study of Replication Research of Promoting Adolescents' Comprehension of Text (PACT): Skill-by-Treatment Interaction for the Effect on Social Studies Content Knowledge

The four paper will describe a multiyear project, that is in the second year of data collection, to replicate research with PACT (Vaughn et al., 2013), but to also implement it through a train-the-trainers model with local coaches. The study also examined the extent to which pre-intervention reading fluency skills predicted student outcomes. Data were collected in 13 middle schools with 26 social studies teachers in the first year. Participating teachers were trained and supported by local coaches. Student knowledge of the social studies content and comprehension of the material were higher in the treatment schools, and there was a significant interaction effect between outcomes and preintervention fluency.

Questions:

What is the best way to assess instructional practices or the business-as-usual conditions in applied research?

What impact does school-to-school variability have on reading instruction and intervention, especially in middle school?

How well would predictive margin analyses show an interaction between baseline skill and intervention effect in other applied research projects?

If one variable predicted intervention effects while piloting the study, should it then be accounted for subsequent data collection?

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Panel Organizer(s): Jessica Rodrigues, University of Missouri (rodriguesjm@missouri.edu)
Discussant, if any: Jason Chow, Vanderbilt University (jason.chow@vanderbilt.edu)
Additional Panelists: Aaron R. Campbell, University of Missouri; Alexandra Shelton, Johns Hopkins University

Additional Authors Not Presenting: Danika L. Pfeiffer, Old Dominion University

Knowledge Mobilization for Amplifying Special Education Research: Examples Across Three Studies

Friday, Feb. 2, 10:15 a.m.-12:15 p.m.
Aurora

Abstract: This panel brings together three researchers who are conducting work to support students with disabilities and English learners and leveraging a variety of research communication strategies. We share three studies focused on diverse content and discuss knowledge mobilization strategies (e.g., visual abstracts, community practice partnerships, professional development) used for communicating findings with broad audiences.

Overview: The persistent gap between research and practice means that practices that could benefit students with disabilities are not consistently reaching the classroom or practice-based settings (e.g., Rycroft-Smith, 2022). Knowledge mobilization (KMb) is thus increasingly being viewed as a national priority and calls scholars to share research in ways that are useful and relevant for practice (NASEM, 2022). This panel brings together three special education researchers-two of whom have not previously attended PCRC which is a stated priority of the conference-who are conducting work to support students with disabilities and leveraging a variety of strategies to mobilize research findings to broad audiences. Each panelist overviews one research study and shares KMb strategies.

Study one (Rodrigues) shares a study within a larger NSF-funded CAREER project and discusses the KMb strategy of using key abstracts for communicating special education research with practitioners (Rodrigues, 2021). A key abstract is a concise, infographic-type summary of a journal article, with visuals, minimal text, and availability of alternative text to support accessibility. The overall NSF project is focused on developing, assessing, and refining innovative key abstracts for communicating-with a teacher audience-research focused on supporting students with or at risk for mathematics difficulty (MD). The Year 1 study is a systematic journal analysis to explore the extent to which What Works Clearinghouse (WWC) research-informed recommendations for supporting students struggling with mathematics (e.g., number lines; Fuchs et al., 2021) are communicated to practitioners via recent articles in prominent special education and mathematics education practitioner journals. Articles included in the analysis are centered on supporting K-6 students with or at risk for MD. Findings will be shared about the extent to which the recommendations for supporting students with MD are being translated to teachers via practitioner articles and how the identified articles vary by WWC recommendation. Rodrigues will also share key abstracts designed for articles identified in the journal analysis that vary across content and/or WWC recommendations. Guidelines both for designing and disseminating key abstracts-that may inform audience members' own KMb practices-will be discussed.

Study two (Pfeiffer) is a qualitative study (Pfeiffer et al., 2021) focused on understanding parents' concerns about their child with autism spectrum disorder (ASD) at their first diagnostic evaluation. Using a conventional content analysis approach, a total of 455 parents' written concerns about their children (ages 1-11 years) from intake forms at an urban outpatient ASD specialty clinic were analyzed. Pfeiffer et al. developed the first inductive coding scheme to identify parental concerns across age groups (toddler, preschooler, middle childhood). While parents reported the same concerns across age groups in six of 12 generated categories, parents of children in the preschooler and middle childhood groups reported more concerns than parents of toddlers, including academic skills and bullying. A KMb strategy used to increase accessibility of this work is self-archiving, the act of making a version of a manuscript legally and freely available on a lab/personal website or in a repository (El Amin et al., 2022). This open science practice can be used by special education scholars to freely share manuscripts reporting evidence-based practices with teachers, clinicians, and other community partners (Pfeiffer et al., 2022). Pfeiffer also hosts her own podcast in addition to leveraging other podcast episodes for sharing her research widely-

another KMb avenue that may be of interest to PCRC members interested in learning about how to "pitch" their research to podcast hosts, etc.
Study three (Campbell) focuses on supporting African American (AA) learners with or at risk for emotional and behavioral disorders (EBDs). AA learners, like all other learners, bring into the classroom their cultural values and the way they express themselves. Unfortunately, all too many AA children experience life and family stressors that place them at-risk for developing emotional and behavioral disorders (Graves et al., 2017). This study used a multiple-baseline-across-classes, single-case, experimental design to evaluate the effects of an intervention approach to promote resilience and well-being among 12 learners ranging from 6 to 11 years old, through developing social-emotional and behavioral competencies that result in observable changes in behavior. The project examined the effects of a culturally adapted social emotional learning (CA-SEL) curriculum, behavior monitoring/management (Check-in/Check-out), and self-monitoring intervention on externalizing behavior of AA male learners. Results showed a decrease in externalizing problem behaviors and increases in social and emotional competencies (Campbell et al., 2023). Strategies for forming research to practice partnerships with community-based centers, Institutes, and non-profits-with a specific focus on how these partnerships can amplify KMb efforts-will be discussed.

Questions:
1. How might the knowledge mobilization strategies discussed in the present panel be leveraged for your own work? How might the strategies need to be adapted or refined, either based on your specific research area of focus, your target audience, or other factors?
2. What barriers stand in the way of effective research dissemination of our work to broad audiences? What supports may be needed to alleviate those barriers, and/or what systems are currently in place at your institution or in your department that facilitate effective dissemination of your work? 3. What other knowledge mobilization strategies that that were not discussed in the present panel have you used to disseminate your work to diverse audiences?

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Cook
Therrien
Friday, Feb. 2, 4:30-6:00 p.m.
Constellation Ballroom

Panel Organizer(s): Bryan Cook, University of Virginia (bc3qu@virginia.edu)
William Therrien, University of Virginia (therrien@virginia.edu)
Additional Panelists: Christina Taylor, University of Virginia; Michael Faggella-Luby, Texas Christian University

Additional Authors Not Presenting: Vivian Wong, University of Virginia

Harnessing collective expertise: Crowdsourcing in special education research

Friday, Feb. 2, 4:30-6:00 p.m.
Constellation Ballroom

Abstract: Crowdsourcing harnesses the collective efforts and skills of many to conduct research. In this panel, we describe how the Special Education Research Accelerator was developed and applied to crowdsource the design and data collection of research in special education across diverse researchers throughout the country.

Overview: 1. Crowdsourcing and Potential Benefits: Though research has generated critical knowledge to guide policy and practice in special education, studies in the field tends to be underpowered, especially when researching students with low-incidence disabilities; conducted with unrepresentative samples from one or a few locations; funded by awards to researchers from a small number of research-intensive institutions; and planned, designed, and conducted in relative isolation. By involving many researchers in research planning and data collection, crowdsourcing can enhance study power, expand sample diversity and representativeness, diversify research teams, and identify key gaps in the research literature and provide blueprints for addressing those gaps.
2. SERA Replication Study: The development and piloting of the Special Education Accelerator (SERA) to crowdsource data collection in special education research was funded by an unsolicited award from IES. We created a website (https://edresearchaccelerator.org/) as a hub for resources and supports to conduct crowdsourced studies (described in Presentation 4) and recruited a network of ~370 diverse research partners from across the country. We piloted SERA by replicating Scruggs and colleagues' (1994) RCT investigating the effects of elaborative interrogation on retention of science facts for elementary students with high-incidence disabilities. In contrast to the original study, we found that the intervention had small, non-significant effects for retention of animal facts among 31 4th- and 5th-grade students with high-incidence disabilities across 7 research sites. Limitations and lessons learned will be discussed.
3. SERA Science Study: The Crowdsource Science project, funded by NSF, is investigating the quantity, type, and quality of science education received by fourth and fifth-grade students with learning disabilities (LD). Utilizing the SERA crowdsource platform, we recruited research partners from all nine sub-census areas in the United States are collecting data from a nationally representative sample of public elementary schools over two years. Employing surveys, interviews, and audio recordings and direct observations of science lessons, we will investigate time allotted to science instruction, attendance of students with LD for science instruction, and curricula implemented. We will also measure students' engagement and achievement, examining variability related to instruction type, quality, and supports. Ultimately, Crowdsource Science seeks to identify instructional features linked to improved science education outcomes for students with LD.
4. Infrastructure and Management of SERA: The successful execution of crowdsourced research requires a well-developed infrastructure that promotes fidelity of implementation across diverse locations and populations. In developing the SERA infrastructure, we leveraged our combined expertise in special education research and study implementation to create a robust framework for data collection, coordination, and standardization that promotes transparency and openness. SERA infrastructure includes (a) password-protected study dashboards that provide detailed study protocols, training videos and material, and study materials; (b) the data repository and other plug-in software components to collect and store data; and (c) communication tools including study-specific Slack channels to communicate with research partners throughout study implementation. In this presentation, we illustrate SERA infrastructure, emphasizing the importance of designing flexible workflows to support procedural and data integrity across research teams and diverse samples.

5. Research Partner Perspective: Crowdsourcing research provides an opportunity to partner with and develop the research skills of special education program faculty and graduate-student researchers, many of whom would not otherwise have the opportunity to work on funded research projects. In this presentation, we discuss the process of leveraging a Laboratory school for students with specific learning disabilities as a participant site for the Scruggs and colleagues (1994) replication study. In particular, opportunities for two graduate students to conduct applied research, learn about fidelity of implementation, and analyze data for their own Masters projects will be discussed. Opportunities and challenges associated with our involvement on the iterative development of materials, securing IRB reliance agreements, and obtaining partner school/family agreement as part of a crowdsourced study will serve to illustrate key issues for consideration.
6. Crowdsourcing research plans to examine effect heterogeneity: While crowdsourcing efforts are valuable for examining the replicability of effects and estimating average effects for an intervention or practice, crowdsourcing on its own can be limited for creating generalizable knowledge. This is because intervention effects often differ among learners, settings, and variations in both intervention and control methods. In this presentation, we will discuss how we are advancing SERA to orchestrate multiple coordinated studies, aiming to define the scope of generalizability for repeated reading interventions. We will describe a new research design - called integrated fractional replication designs - for estimating generalizable intervention effects. We argue that new modes for organizing, conducting, and funding of coordinated research designs are needed to examine effect heterogeneity and produce generalizable evidence.

Questions:
1. What are some of the obstacles and limitations to crowdsourcing research in special education? Is crowdsourcing a viable approach for conducting research in special education? 2. What types of studies can and cannot be conducted via crowdsourcing? 3. How will SERA be managed (e.g., who decides what studies are conducted using SERA?)? 4. How can I become involved in SERA?