2020 Education Innovation and Research (EIR) Project Directors and Evaluators Technical Assistance Meeting

Virtual Meeting | October 21–23, 2020

Showcase of Complex Evaluation Designs for Complex Interventions

Jessaca Spybrook | Beth Boulay (Facilitators)

Abt Associates

Beth Boulay

Role: TA Liaison

Background: Beth is a Principal Associate in Abt Associates' Social and Economic Policy division. Beth is a seasoned evaluator who understands the challenges of conducting rigorous, field-based evaluations of educational interventions. She has spent the last 9 years providing a range of supports to non-profits and school districts and their evaluation partners to help them build credible evidence on program effectiveness. She was the project director for the i3 Technical Assistance and Evaluation Project from 2010-2017.

Jessaca Spybrook

Role: TA Liaison

Background: Jessaca is a Professor at Western Michigan University in the Evaluation, Measurement, and Research Program. Her research focuses on improving the design and analysis of impact trials, and particularly around issues related to statistical power. She is also part of the technical assistance team for the i3 and EIR grant programs.

Erin Hearn

Role: Grantee

Background: Erin Hearn, MAPP, is a speaker, trainer, and researcher who specializes in creating curriculum, coaching educators, and leading professional development through a lense of social emotional learning and positive psychology. She currently serves at IDEA Public Schools as the Director of C3: Culture, Character, and College. In this capacity she works with schools to create reflective experiences for students to explore and develop their sense of agency, resilience, and identity. Previously, Erin worked for Uplift Education as the Director of Social Emotional Learning. She holds a bachelor's degree in psychology from The Pennsylvania State University and received a master's of applied positive psychology from The University of Pennsylvania. Erin is a certified yoga instructor and enjoys hiking and gardening.

Christina Steiner

Role: Evaluator

Background: Christina Steiner is a quantitative researcher with Copia Consulting. Prior to Copia, Christina worked at the RAND Corporation, a public-policy think-tank known for rigorous research on cutting-edge topics. At RAND, she worked for a range of clients from the United States Army Recruiting Command to the California Earthquake Authority and the Bill and Melinda Gates Foundation. Christina's doctoral studies focused on measuring the determinants of turnover in the Army Civilian workforce (200,000+ people) using a 30-year dataset. Christina has a PhD in public policy analysis from the Pardee RAND Graduate School, an MBA in strategic marketing from UT Austin, and a BA in economics and Spanish from Wellesley College. Christina was also a Teach for America (TFA) corps member (RGV '04). TFA was a formative experience that forever piqued her interest in discovering what works in increasing educational equity and improving child welfare. Recently Christina was selected to be part of the approval process for new charter schools in the state of Texas. Christina lives outside of San Diego with three large mixed-breed dogs (think: 200+ lbs, collectively). She enjoys long pack walks, mountain biking, and tending to her herb garden.

Jeff Gray

Role: Grantee

Background: Jeff Gray is a Professor in the Department of Computer Science at the University of Alabama where he co-directs the Software Engineering Laboratory. His research interests are in software engineering and computer science education. Jeff received a BS and MS in Computer Science from West Virginia University and a Ph.D. in Computer Science from Vanderbilt University. Since 2004, he has been active in offering various activities (e.g., summer camps, contests, and mentoring on science fair projects) to K-12 students while also initiating numerous professional development opportunities for K-12 teachers. As a Code.org CS Fundamentals facilitator, he has trained over 2,400 K-5 teachers (primarily in Alabama); through a Google CS4HS project, he also trained over 2,100 high school teachers nationally to prepare for the College Board AP CS Principles curriculum. Dr. Gray is the PI or co-PI on 27 funded projects that address computer science education, primarily in the state of Alabama through efforts to improve diversity and inclusion. A current example of one of his projects is the National Science Foundation (NSF) LEGACY effort, which provides a preparatory experience for Black female students who are enrolled in a College Board AP CS Principles course. In 2017, Jeff was invited to serve as co-Chair of Alabama Governor Kay Ivey's Computer Science Advisory Council, and he also serves on the Executive Committee of the Alabama STEM Council. Jeff is the co-Editor-in-Chief of the Journal on Software and Systems Modeling (SoSyM). The following are honors that he has received throughout his career: NSF CAREER recipient, ACM Distinguished Member, and the Carnegie Foundation Professor of the Year (Alabama). More information about Jeff's work can be found at: http://gray.cs.ua.edu

Kathy Haynie

Role: Evaluator

Background: Kathy Haynie is the Director of Haynie Research and Evaluation (HRE) since 2002, after receiving her Ph.D. in Educational Psychology from Stanford University. Her company has served as the Co-PI, Research Director, and External Evaluator on myriad projects-- recently, the Pathways for Alabama Computer Science (APCS) EIR project, the TRIPODS Data-Inspire Center at Rutgers University, and Alabama's LEGACY project that prepares Black female students for AP CS Principles. Kathy Haynie has taught at Rutgers University and San Jose State University. Her collaborative research work has been published in Educational and Psychological Measurement. In addition to her Ph.D., Kathy received her M.Ed. from Rutgers University in Educational Statistics and Measurement, and her B.A. in mathematics and music from Oberlin College. On the lighter side, Kathy has twice performed "Year of the Cat" with Al Stewart! She is an avid chamber music player (recently participating in the Bennington Chamber Music Conference) and community musician. In her spare time, Kathy can be found hiking or taking a yoga class.

Agenda

- Overview of what makes EIR funded interventions complex
- Overview of how evaluation designs are complex
- Guest panelists: Showcase of two examples
  - IDEA C3: Erin Hearn (Idea Public Schools), Christina Steiner (Copia Consulting)
  - Pathways for Alabama Computer Science (PACS): Jeff Gray (University of Alabama) and Kathy Haynie (Haynie Research and Evaluation)
- Reflections on complex designs for evaluating complex interventions

EIR Funds Complex Interventions

- Complexities in interventions funded by EIR include:
  - Having multiple key components
  - Delivering services and resources for schools, teachers, and students
  - Aiming to affect outcomes that are necessary pre-cursors to academic success
  - Delivering resources in a particular sequence
  - Targeting services to a wide age/grade range

Complex Interventions Create Challenges for Evaluation

- Multiple key components each contribute to an overall impact
- Tracking service delivery to and by multiple stakeholders is challenging
- Reliably measuring a range of outcomes is resource intensive
- Aligning data collection and analysis to the schedule of a sequenced intervention
- Aligning outcome measurement at different grade levels when both the constructs and the measures are different.

Complex Evaluation Designs Address Challenges

- Multiple impact studies within an evaluation can have unique designs to address questions about different components
- Evaluations can leverage planned or natural variation in service delivery across multiple stakeholders to provide evidence of their relative effectiveness
- Grantees and evaluators team to create measures of early indicators of impacts on students.
- Deliberate choices about where to focus the research questions to maximize learning and rigor

Two EIR Studies with Complex Interventions and Evaluation Designs

- IDEA C3: Culture, Character, and College
  - Description of Intervention: Erin Hearn
  - Description of Impact Study: Christina Steiner

- Pathways for Alabama Computer Science
  - Description of Intervention: Jeff Gray
  - Description of Impact Study: Kathy Haynie

IDEA C3: Culture, Character, and College

Six Observable Skills: We A.R.E. College Bound

Agency

1. Goal Orientation
I set personally purposeful goals and create plans.

2. Ownership
I know what is in my control and take initiative on those items.

Resilience

3. Growth Mindset
I learn from my mistakes and make changes base on past performance.

4. Perseverance
I use strategies to manage my emotions and behaviors.

Exploration

5. College Exploration
I seek out opportunities to learn about college and career.

6. Personal Exploration
I know myself – my history, values, strengths, and passions.

Four High Leverage Interventions

School Year 20/21

- 12,707 Students at 22 Treatment Schools
  - 7,832 Middle School Students
  - 4,875 High School Students
  - 40 Counselors
- First year of 2-year intervention

IDEA C3: Culture, Character, and College

Intervention Description

Inputs

(1) IDEA's College Success Team

(2) EIR Funding

(3) Partnership with College Counseling Organization InsideTrack and External Evaluators

(4) High Quality Teachers and Counselors in Schools

Outputs

Activities

(1) PD for college counselors on coaching model designed to promote college-going identity PD for DCCs on implementation and supervision and for trainers and HQ staff on sustaining model post-grant

(2) PD for teachers 6-12 on college- going identity essential teaching skills

(3) C3 Curriculum; Training and delivery of student intervention to be delivered through RTTC curriculum

(4) Training for 7th, 11th and 12th grade parents related to supporting college going identity

Outcomes

Short-Term Mediators

- Changes in pedagogy & practice to develop student college- going identity
- Changes in counseling practice including college counseling theory & practice includes coaching model

Mid-Term

- Students develop improved college identity
- Students have higher attendance rates
- Students demonstrate higher achievement in math, reading, and ACT scores
- Improved campus climate

Long-Term

- More students apply to selective and highly selective universities
- More students enroll and persist in college
- More students graduate from college within 4-6 years

Impact Study

IDEA C3: Culture, Character, and College

Impact Study

- 1 Complexity: Theoretically Impacts May Vary by Age/Grade
- 2 Complexity: Not All Grade Levels Take the Same Tests
- 3 Complexity: Three Outcome Domains
  - Outcomes include Academic, College Access, and Social Emotional Learning
  - Outcomes are aligned to grade-level cohorts, except SEL
    - 7th grade: Renaissance STAR
    - 9th grade: ACT
    - 11th grade: Acceptance to Tier I Colleges
    - 7th, 9th, and 11th grade: Social Emotional Learning Outcomes

IDEA C3: Culture, Character, and College

Impact Study- Outcomes by Domain and Grade (with Covid Complications*)

Grade/Domain	Academic	College Access	SEL
7th	Renaissance STAR* (pre/post)	N/A	SEL (pre/post) • Grit • Self-Efficacy • Growth Mindset
9th	ACT* (pre-ACT baseline/ACT post)	N/A	
11th	N/A	Acceptance to Tier I Colleges (ACT baseline)	

- 22 Treatment and 22 Control Schools
  - Blocked on region (RGV, San Antonio, Austin, El Paso) and IB status (Yes/No)
  - PSM to establish baseline equivalence

Pathways for Alabama Computer Science (PACS)

Pathways for Alabama Computer Science (PACS)

Intervention Description

- **Rationale for Intervention**
  - In Alabama, a pathway of CS courses is needed to gain students' interest while strengthening content knowledge (esp. in rural areas)
  - Counselors can benefit from training on topics related to broadening participation in computing and CS career awareness
  - Rural teachers separated geographically from a peer cohort can gain confidence when participating in a CS professional learning community
- **Summary of Intervention**
  - "CSPdWeek" format brings four different trainings together to build a CS professional learning community
    - Bootstrap: Algebra integration
    - ECS: Exploring Computer Science (9/10th grade focus)
    - AP CS Principles: College Board AP
    - NCWIT Counselors for Computing (C4C)
  - Year-round follow-up and professional learning community
  - Goal is for high schools (especially rural schools) to establish computer science pathways
  - 110 teachers and 70 counselors in Year 0 (virtually in Summer 2020, due to COVID-19)
    - Recruiting, logistical, and connectivity challenges
  - Total of 440 teachers and 250 counselors over 4 years, geographical span of 350 miles
  - Fidelity of implementation evaluation is informing implementation
  - Outcomes are student preparation (Computational Thinking, CS attitudes) for CS-related work and study

Pathways for Alabama Computer Science (PACS): Intervention

Key Components		Mediators	Outcomes		
			Short	*Medium*	*Long*
Exploring Computer Science (ECS) PD to Teachers	**CS Professional Development to Counselors (C4C)**	Teachers implement CS courses within schools	Students receive CS-infused instruction via pathway courses	Increase in students' computational thinking, algebraic problem-solving	Increase in student enrollment, qualifying scores
Bootstrap Algebra PD to Teachers	**Community of Practice to Schools (SCoP)**	Counselors support students in studying CS	Students receive supports for CS study	Increase in students' attitudes, CS/STEM career interest	Students successfully move through CS pathways
AP CS Principles PD to Teachers (UTeach)	*Teachers/Counselors within schools draw resources, support, planning opportunities*	SCoPs form and pursue CS pathway goals	Initial CS culture and pathways are established within schools	CS pathways are fully established within schools	Students engage in CS-related workforce, internships, undergraduate study

Impact Study

Pathways for Alabama Computer Science (PACS)

Impact Study Design

- What makes this design complex?
  - PD in three courses + C4C every summer for Years 0-3, followed by course implementations
  - Could study outcomes of individual courses – teacher-level RCTs
- Idea of an entire pathway as an intervention
  - Focus on cumulative effects of this pathway for **one** group of students
  - Long-term effects on:
    - students' computational thinking and problem-solving (two + one time-points)
    - CS attitudes and CS-STEM career interest (three time-points)
  - Issues of strength of intervention (optional courses, attrition), appropriate measures for a range of grades

Pathways for Alabama Computer Science (PACS): Impact Study

Random Assignment of High Schools to T or C conditions. Each high school serves grades 9, 10, 11, 12. Three years of treatment.
If students are randomly assigned to T and C conditions within schools, this diagram assumes that treatment/control status is maintained as students move up from 9th to 10th grade, and from 10th to 11th, and assumes that joiner students are randomly assigned to T and C when they enter study schools.

Year 0 2020/2021	Cell A 8th Grade Baseline			Cell J 8th Grade Baseline		**Baseline Measures** 8th Grade State Level Math %Free&reduced price lunch*
Year 1 2021/2022 Exploring Computer Science	Cell B **9th Grade** 1 Year of Treatment Program Year = 1 Opt in		Cell F **9th Grade** 1 Year of Treatment Program Year = 1 Opt out	Cell K **9th Grade** No treatment No CS course		**Outcome Measures+** Comp Thinking Assessment CS Attitudes CS-STEM Career Interest
Year 2 2022/2023 Algebra I with Bootstrap	Cell C **10th Grade** 2 Years of Treatment Program Year =2 Required		Cell G **10th Grade** 1 Yr of Trt Program Year =2 Required	Cell L **10th Grade** No treatment Algebra I without Bootstrap Required		Algebraic Problem Solving CS Attitudes CS-STEM Career Interest
Year 3 2023/2024 AP CS Principles (UTeach)	Cell D **11th Grade** 3 Yrs Trt Program Year =3 Opt in	Cell E **11th Grade** 2 Yrs Trt Pgm Yr =3 Opt out	Cell H **11th Grade** 2 Yrs Trt Pgm Yr =3 Opt in	Cell I **11th Grade** 1 Yr Trt Pgm Yr =3 Opt out	Cell M **11th Grade** No treatment AP CS Principles (A+CR) Opt in if available	Cell N **11th Grade** No treatment AP CS Principles (A+CR) Opt out if available	Comp Thinking Assessment CS Attitudes CS-STEM Career Interest % Enrolled (opt in)*

*School-level measure
+Individual-level outcome measures given at end of school year

Questions and Discussion

Potential Discussion Questions

- For Virtual Participants:
  - What complexities in interventions have others faced?
  - How did these complexities shape the evaluation design?

- For Panelists:
  - The complexities present in these interventions make designing the evaluation more challenging. Can you tell us about the process you all used to work together to ensure the evaluation design fit the intervention.
  - How did potential WWC ratings factor into decisions regarding the evaluation design for these complex interventions?

Contact

EIR Evaluation TA Team

EIREvalTA@AbtAssoc.com

abtassociates.com