A primary goal of Research-Practice Partnerships (RPPs) is to impact decision making in education through the use of research evidence (NNERPP, 2019). At present, few studies examine the defining features of effective research use and the conditions necessary to maximize its potential (Gitomer and Crouse, 2019). Empirical evidence is needed to further understand precisely how and in what ways the use of research evidence in RPPs is impacting decision making in education and, ultimately, improving outcomes for children.

RPPs have emerged as a promising strategy to bridge the current gulf between research and practice by bringing together experts from both fields to address problems facing K-12 U.S. education.

The goal of this theme study is to elucidate what data use looks like across a range of CSforALL RPPs and bring to light examples of how and in what ways data is being used within the RPPforCS community.

References:

The University of Northern Iowa (UNI) Partnership for Computer Science (CS) Teacher Preparation is a research-practitioner partnership (RPP) aiming to facilitate professional development (PD) for computer science teachers across Iowa. The partnership connects four faculty at the UNI with a cohort of 29 teachers from 25 school districts, most located within 90 miles of Cedar Falls, Iowa.

The PD program includes a sequence of five courses developed and led by a PD design team of four faculty and staff members at UNI. The PD design team meets weekly during the school year and several times per week during the summer to design courses, discuss the implementation of the courses, and plan upcoming face-to-face meetings. The program includes both online and face-to-face interactions between course instructors and participating teachers, most of whom are completing the coursework as a step toward earning a state CS endorsement, which has recently been made available for teachers in Iowa. The cohort began coursework during the summer of 2018 with an *Intro to Programming* course, followed during the 2018-2019 school year by *Teaching and Learning Programming*, in turn followed by *Foundational Concepts* during the summer of 2019. As of this writing, the teachers have completed three of the five courses and are currently taking a *Data Structures and Algorithms* course. Participants funded through the NSF grant receive mileage and a $50 stipend each time they come to campus for a face-to-face meetup. Teachers that do not come to campus can still take the course and earn the credit, but they do not receive a stipend. Participating teachers also receive a scholarship to cover their tuition. Beginning in Fall 2019, these courses are also a part of an undergraduate teacher preparation program at the University of Northern Iowa.

**TYPES OF DATA COLLECTED**

**TEACHER SURVEY DATA:** The RPP initially collected survey data from the participating teachers at the beginning of the study, gathering baseline information on their demographics, views on the nature of computer science, beliefs about their personal ability to succeed in CS, feelings about teaching CS, and beliefs about who typically succeeds in CS. The same survey was re-administered at the beginning of the second year of the program and will be administered a third time at the completion of the five-course program. Findings from the survey data have been shared with the PD design team during weekly meetings.

**STUDENT SURVEY DATA:** All teachers in this cohort are currently teaching a CS course during the 2019-2020 school year. The RPP plans to collect related survey data from students of the participating teachers in the RPP, once at the beginning of the year and again at the end of the
year. This data will be shared with teachers at the beginning of the year to inform their understanding of their students and support their instructional decision-making. The year-end data will likewise be shared to provide the participating teachers with data reflecting student growth/change over the course of the school year.

**COURSE INSTRUCTOR EXPERIENCE/FEEDBACK:** After each face-to-face meeting, the PD design team meets to debrief and discuss the implementation of the course. Team members share teaching experiences, discuss feedback from participating teachers, and make plans to integrate what they have learned into the course design process.

**TEACHER FACE-TO-FACE FEEDBACK DATA:** At every in-person meeting, course instructors allocated time for teachers to provide in-person feedback on the curriculum and PD meetings. Teachers were asked (in a classroom discussion format) to share feedback, including teaching approaches that have been working and those that have not. This data is also discussed in an ongoing manner at weekly meeting

### HOW DATA SUPPORTS THE WORK OF THE PARTNERSHIP

**For example, feedback from the instructors and participating teachers indicated that the first course taught to cohort 1 was less effective than anticipated because it was taught as an eight week course, which was too compressed of a time period. This information shaped adjustments to the sequence of courses, delivery approach, and course expectations for cohort 2.**

**Data-informed initial course design:** Although the courses were designed before the baseline teacher survey was administered, the initial teacher survey was analyzed quickly and shared back with the PD design team to help members determine whether revisions should be made to the curriculum. Findings from the initial teacher survey data aligned with the initial hypotheses, prompting few revisions.

**Data informs ongoing course redesign:** The faculty consistently interact with teacher participants to understand which approaches to teaching CS are working best and meet regularly to discuss participant progress and course implementation. Course designers regularly use data from online comments, face-to-face conversations PD sessions, and observations from course instructors to inform the re-design of the CS PD courses – revisions that impact the 2nd cohort of participating teachers. For example, feedback from the instructors and participating teachers indicated that the first course taught to cohort 1 was less effective than anticipated because it was taught as an eight week course, which was too compressed of a time period. This information shaped adjustments to the sequence of courses, delivery approach, and course expectations for cohort 2.

**Data will be used to inform teacher instructional decision-making:** This RPP intends to support teachers in achieving their goals by providing them with both baseline and end-of-course student-level survey data.
Understanding How Participating In Rigorous Cs Learning Opportunities Impacts Cs Teachers’ Views And Beliefs About Teaching: This PD program is intentionally designed to model for teachers best practices in planning lessons, creating engaging and equitable assignments, and demonstrating unbiased and supportive instructional practices. The research aims to understand how these practices impact the ways teachers understand and teach CS as they move through the five different courses.

Understanding The Relationship Between Teacher Participation In The Program And Student Experiences In The Classroom: The RPP intends to use the pre- and post-survey data from the students of participating teachers in conjunction with the teacher survey data to better understand changes the CS course may bring about in beliefs and views about CS among participating teachers and their students.

CS FOR ALL IN SANTA CRUZ CITY SCHOOLS

CS For ALL in Santa Cruz City Schools is an Research-Practice Partnership (RPP) between Education, Training, Research (ETR), Santa Cruz City Schools (SCCS), and the Santa Cruz Education Foundation (SCEF). The goal of the RPP is to develop systems and interest to increase equity in computer science education. District partners include superintendents, directors of Curriculum and Instruction, principals, teachers, library media teachers, community coordinators, and other staff.

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TYPES OF DATA COLLECTED

COMPUTER SCIENCE LANDSCAPE SURVEY: During the 2018-2019 school year, researchers invited teachers/staff, students, and families to complete a survey about their technology use and views. The survey results provided the district with baseline data to better understand the technology landscape of the district.

COMPUTER SCIENCE QUESTIONS ADDED TO THE DISTRICT’S ANNUAL SURVEY: This year, the RPP has had the opportunity to develop and add three additional questions to an annual survey the district administers to its constituents. These questions were co-designed with researchers and district leaders. They build on findings from the technology landscape survey administered last school year and can be used to inform district on how families view the importance of CS and barriers they face accessing technology.
QUESTIONS ADDED TO THE ANNUAL FAMILY SURVEY:

1. How important is it to have opportunities and resources for your child to learn CS at school? (likert scale)
2. How important is to have opportunities and resources for you to learn CS at school? (think important but don’t need; think important and will; not important)
3. Why don’t you use illuminate? Challenges around using it…

HOW DATA SUPPORTS THE WORK OF THE PARTNERSHIP

For example, in one meeting that included curriculum developers and teachers, the group discussed a student-level finding related to cyberbullying and safety. Although the student survey data indicated that many students reported feeling safe online, the teachers present raised the concern that, in their experience, students often maintain a false sense of security related to online safety. To the teachers, the high proportion of students “feeling safe online” indicated a need for more, not less, student training and support in this area. This

Supporting district leaders’ understanding of SCCS’s technology landscape: Using data from the technology landscape survey, the research side of the RPP developed a technology report to share with district partners in advance of a monthly RPP meeting. Findings were discussed in multiple monthly meetings throughout the year. District leader participants reported that the findings often confirmed what they intuitively sensed through their experiences working in the district. This technology report included all the survey results, a potentially overwhelming bulk of information.

A goal for the 2019-2020 school year is to make information more accessible and useful for district and school leaders. The research-side partners, in collaboration with a newly hired practice-side partnership coordinator, plan to devise dissemination approaches that are more readily understood and useful for district and school leaders. For example, the project intends to develop one-pagers for district and school leaders that break down findings by families, staff, and students. In addition, the RPP intends to further support data interpretation and use by including recommendations for areas of focus in response to the research findings.

Supporting strategic planning for district-level technology: Data from the research briefs informed the development of the district’s current five-year technology plan. District leaders incorporated many of the findings and data representations into the strategic planning document, indicating that the findings produced by the RPP were valuable for this planning process.

Supporting RPP changes in scope of work: Data from the landscape survey was used to determine the scope and work plan for the second year of the project. Data from the parent and student surveys pointed to a specific need in an underserved area of the city. The survey data helped to identify some disparities in access to CS education, which informed the choice of specific schools that reached the underserved students and families.

Supporting data interpretation conversations among role groups within the district: Last year, the RPP held data interpretation meetings that included representatives from a variety of role groups in the
Discussion provided a valuable opportunity to incorporate teacher experience when interpreting student survey data.

district. These meetings proved valuable to the RPP because each participant brought their own perspectives and expertise to the discussion. For example, in one meeting that included curriculum developers and teachers, the group discussed a student-level finding related to cyberbullying and safety. Although the student survey data indicated that many students reported feeling safe online, the teachers present raised the concern that, in their experience, students often maintain a false sense of security related to online safety. To the teachers, the high proportion of students “feeling safe online” indicated a need for more, not less, student training and support in this area. This discussion provided a valuable opportunity to incorporate teacher experience when interpreting student survey data.

Changes Related to Data Use in Phase Two of the Study

After the first year of the study, the RPP identified the need for a liaison that works inside the district, resulting in the hire of a retired district leader to serve in that capacity. The coordinator will serve as a liaison between the district and the research partners as well as participate in co-design activities related to survey question design and school-level partnership activities.

In addition, inspired in part by participation in the annual forum of the National Network of Research Practice Partnerships (NNERPP), the partnership plans to make their RPP’s goals for data use more explicit by collaboratively developing concrete plans for how and in what ways data produced in the RPP might be used to positively impact decision-making within the district. By developing practical theories for how the data can best be used by the district, the project intends to forge clear connections between which data is collected, how findings are disseminated, and how findings are used to make a difference for teachers, students, and parents in Santa Cruz.

Supporting Computing Access, Leadership, and Equity in California (SCALE-CS)

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Data Used in the RPP

NIC Member Data: The partnership collects information from the NIC participants during monthly meetings and after RPP events. For example, the RPP held a kickoff event involving all NIC
members, including the leadership team and the practice-side partners. During this event, the AIR team facilitated a collective activity that resulted in the co-creation of a fishbone diagram to support the NIC in developing a shared understanding of the complex system that shapes equitable CS implementation in California. At the end of this event, the external evaluators collected survey data to gain a sense of participant experiences related to this event. Another example involves AIR collecting survey data from all RPP members to assess the health of the RPP.

**DATA COLLECTED (PRE-RPP) BY EARLY ADOPTER ADMINISTRATORS:** Two administrators in the NIC developed a spreadsheet on which they tracked questions asked by administrators in other schools or districts, along with their answers. This data served as a launching point for further data collection and analysis, ultimately resulting in the development of an administrator guide.

In addition, after the first version of the administrator guide was developed, team members from AIR conducted Plan, Do, Study, Act (PDSA) cycles to improve it in later versions. This process included interviewing additional people across the state (including researchers, school administrators, and CS experts) to understand what had proved useful about the guide and what aspects needed adjustment.

**SURVEY AND INTERVIEW DATA FROM PROFESSIONAL DEVELOPMENT (PD) PARTICIPANTS AND FACILITATORS:** Members of the RPP co-hosted a CS PD week during summer 2019. Data collected from this event included a survey of CS PD week participants (including teachers, counselors, and administrators), as well as survey administered to only those administrators who attended the specific workshop designed around the CS implementation administrator guide. The RPP conducted additional interviews of a sample of administrators in order to gather additional insights not obtainable through surveys. Facilitators of the 6 PDs were also interviewed.

All the above mentioned data is shared and discussed in bi-weekly leadership meetings as well as in the monthly NIC meetings. Typically, team members from AIR conduct analyses and create a presentation to share findings with the group. At these team meetings, team members discuss the findings, raise questions for further clarification and investigation, and determine next steps based on the results. For example, during the September 2019 meeting, AIR team members shared a presentation of findings from the data collected about the summer PD, and in November 2019, the AIR team plans to share a presentation and engage in discussions around the RPP health assessment.

**DATA IS USED WITHIN THE RPP IN THE FOLLOWING WAYS**

| For example, the survey data collected during the RPP kickoff event revealed that the RPP had spent too little time discussing and developing a | Defining and adjusting the work of the partnership: Data is used in an ongoing way to develop shared understandings within the partnership and assess its health and progress. For example, the survey data collected during the RPP kickoff event revealed that the RPP had spent too little time discussing and developing a shared vision of equity, a key focus of the partnership. In order to respond to this finding, the RPP engaged in additional co-design around equity, ultimately resulting in an agreed-upon definition. |
shared vision of equity, a key focus of the partnership. In order to respond to this finding, the RPP engaged in additional co-design around equity, ultimately resulting in an agreed-upon definition.

Developing and revising tools, resources, and learning opportunities for administrators: The RPP used data to develop a resource guide for administrators to support CS implementation and later to revise that guide to better meet the needs of administrators. The guide was then used as the grounding resource for a professional development workshop for school administrators during summer 2019 (during CS PD week in Sacramento).

Assessing changes in policy and practice. As the RPP continues to progress, it intends to collect longitudinal data to assess changes in administrator practice over time. For example, the RPP has collected action plans from a sub-group of administrators who attended the summer PD. If the RPP has the resources to collect follow-up data from these instructional leaders, the RPP can better understand the challenges administrators face when implementing CS action plans and use that information to suggest adjustments to resources and supports. In addition, the RPP would like to use data to support new policies regarding professional development for CS education.

PULLING IT ALL TOGETHER

The goal of this research brief was to dig deeper into data use in CSforALL RPPs to understand how and in what ways the use of research evidence in RPPs is impacting decision making in education and, ultimately, improving outcomes for children.

When looking across these three examples of data use in CS RPPs, three themes emerge: data is used to inform planning (the work of the partnership), to inform adjustments (changes and adaptations within the partnership), and to further collective understanding (both within the partnership and for the broader research and practice community.)

Decision-making around what to do (planning). In the projects included in this brief, data informed planning in several ways, including the planning of the work of a partnership, professional development activities, tools development, and teacher instructional planning.

Decision-making around what to do next (adjustments). In the projects included in this brief, data informed ongoing course redesign, strategic planning, adjustments to the partnership scope of work and how the work gets done within the partnership.

Furthering collective understanding. In the projects included in this brief, data supported the development of collective understanding within the partnership, within the practice organization, and also for the broader community. Examples include using data to further conversations among role groups within the district office, using data to further district leaders’ understanding of the current technology landscape, and using data to deepen the research community’s understanding of how rigorous professional development opportunities impact teachers’ views and beliefs about teaching computer science, students’ experiences in the classroom.
RESOURCES

AERA published a blog post on November 13th, 2019: *Inspiring data excitement*. In it they offer the following “Rad Resources”:

- **Participatory analysis** is a method that helps evaluators and stakeholders make meaning out of the data. Here is an overview of the process from Learning for Action.

- **Data walks** are another strategy to engage stakeholders in data interpretation. Here is one example of how to use data walks to share data with communities presented by the Urban Institute.

- **Data placemats** can help facilitate learning conversations, as shown in this previous AEA365 post from the Department of Evaluation and Learning at Jewish Family and Children’s Service Boston.