A young girl with dark hair, wearing a bright pink jacket, is sitting at a desk and looking intently at a laptop screen. Her hands are on the keyboard. To her right, a LEGO Mindstorms robot is assembled on the desk. The background is slightly blurred, showing other people in a classroom or workshop setting. The image is overlaid with a semi-transparent circular graphic that has a scale from 40 to 210 and some faint text like '0-7' and '0-2'.

EFFECTS OF THE 4TH/5TH- GRADE CODER-IN- RESIDENCE PROGRAM: GIGABOTS!

**MARI STRAND CARY & PATRICK KENNEDY,
UNIVERSITY OF OREGON**

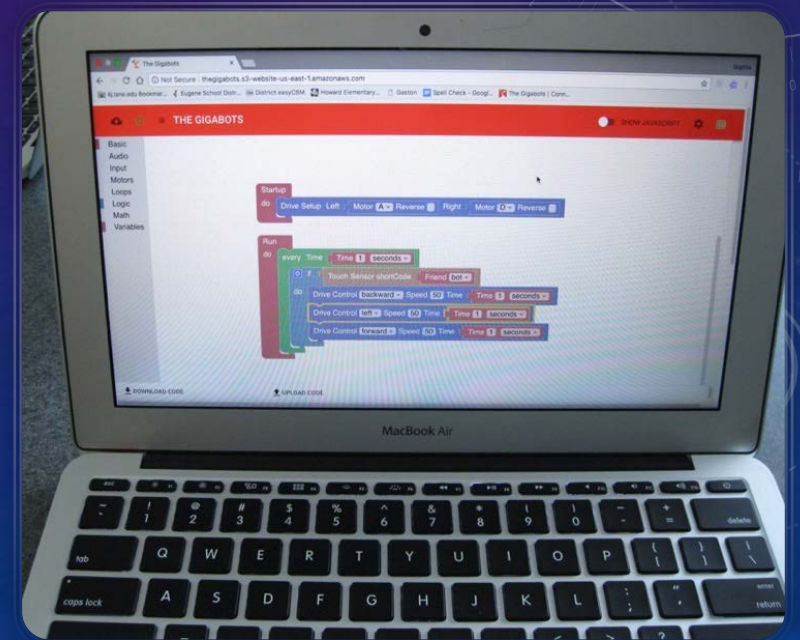
**HEIDI LARWICK & MATT HAYES, CONNECTED
LANE COUNTY**

SREE, WASHINGTON, D.C.

MARCH 2020

CODER-IN-RESIDENCE (CIR) PROGRAM GOALS

- Increase STEM opportunities for young students.
- If Lane County (and society) are to eliminate the STEM gender/racial gap, we need to engage young students in STEM
- Boost STEM interest, engagement, knowledge and positive STEM self-identity
- Prioritize equitable access



CIR RESEARCH PARTNERS

- **Connected Lane County**
- **Center on Teaching and Learning, University of Oregon**
- Lane County school districts
- “Coders-in-residence” from CBT Nuggets – Feynman Group – LTD – OSU - Peace Health – Pipeworks – Sheer ID -- the larger community
- Funded by Mozilla, Oregon Department of Education, and Institute of Education Sciences



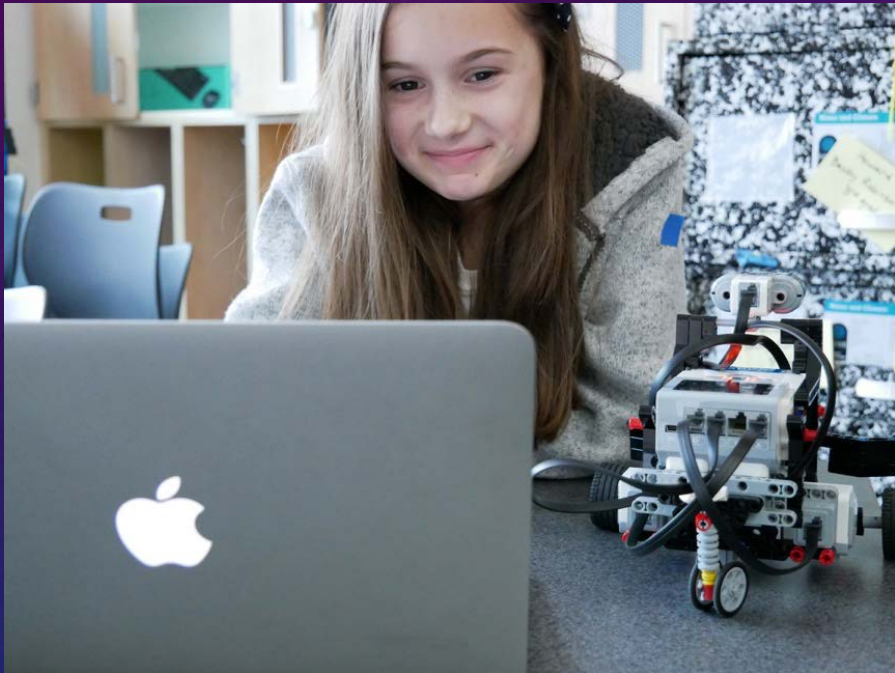
The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through grant R305L180016 to Lane ESD. The opinions expressed are those of the authors and do not represent the views of the Institute or the U.S. Department of Education.

CTL Center on Teaching & Learning

LANE STEM

- To what extent does exposure to CIR impact students' knowledge of programming and related concepts and their perceived self-efficacy in those areas?
- We hypothesize that students who receive CIR will demonstrate greater knowledge of coding concepts, express more confidence in their ability, and be interested in pursuing additional CS-related opportunities at a higher rate than students who do not participate in CIR.

THE STUDY DESIGN



- School-level RCT (CIR vs. BAU)
- CIR
 - Pair (women) who work in tech careers with Grade 4/5 teachers
 - 2 PD sessions for teachers +/- coders
 - 6-weeks (6 hours) of programming with Lego Mindstorm robots
 - Lesson logs & student exit tickets
- Proximal and distal measures (same year and, if available, following year)

MEASURES

- Students:
 - math pretest (covariate)
 - coding basics (pre/post)
 - attitudes toward CS and "CS traits" (pre/post)
 - coding and perseverance (pre/post)
 - Exit tickets (*CIR only*)
 - District-collected data (grades, attendance, easyCBM scores, state assessment scores, demographics)
- Teacher/coder
 - Surveys (Pre, Post PD, Post Implementation)
 - Lesson logs (*CIR only*)

Pilot project (2017-18)	Coh1 (Fall '18)	Coh2 (Winter '19)	Coh3 (Spr '19)	Coh4 (Fall '19)
2 districts	7 districts	6 districts	2 districts	3 districts
3 schools	9 schools	9 schools	4 schools	4 schools
197 Students (all using GBot)	639 Students (403 using GBot)	599 Students (381 using GBot)	208 Students (124 using Gbot)	350 Students (217 using GBot)
5 Teachers (all using GBot)	38 Teachers (17 using GBot)	33 Teachers (20 using GBot)	7 teachers (4 using GBot)	12 teachers (7 using GBot)
5 Coders	6 Coders	10 Coders	4 Coders	3 Coders

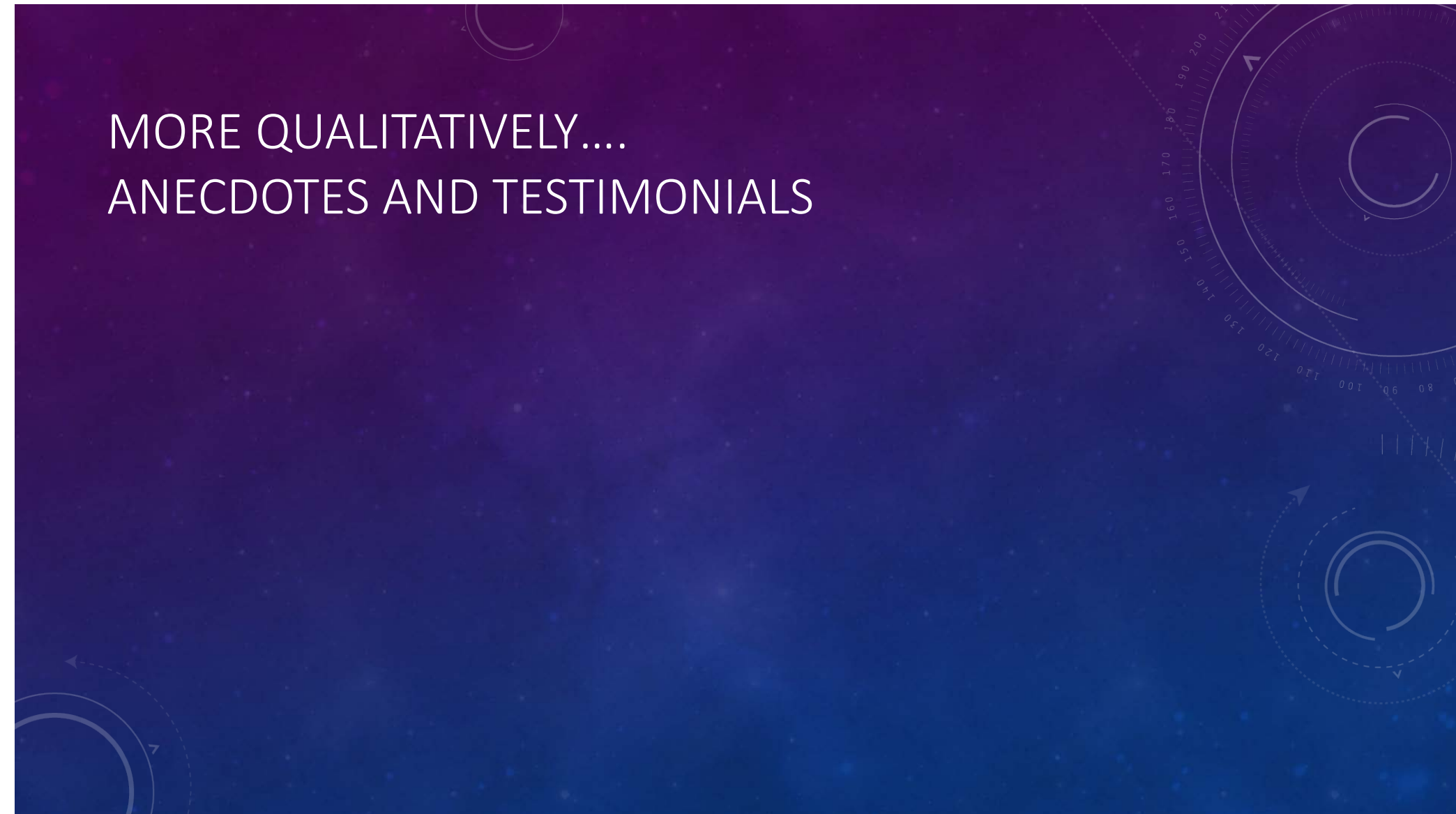
“CONTROL SCHOOLS” ENGAGING IN CIR IN 2019-20

(THIS MADE RANDOM ASSIGNMENT DURING EVALUATION MORE PALATABLE AND GIVES US OPPORTUNITY TO CONTINUE SCALING AND ADDRESSING SUSTAINABILITY)

QUANTITATIVE RESULTS

- Coming soon! (Slides will be updated by mid-February, we think!)

MORE QUALITATIVELY....
ANECDOTES AND TESTIMONIALS

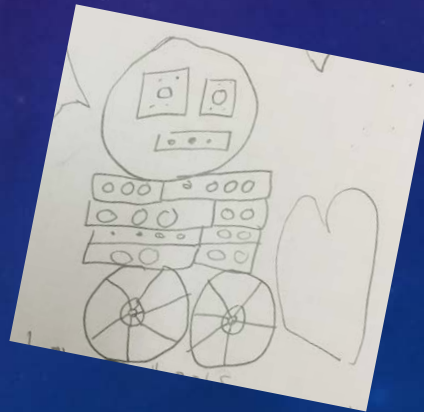




“A female Latinx student [who struggles with anxiety and] who gets very frustrated and gives up, easily had huge successes with her group, and especially lit up at the video showing female coders and coders of color. **I think she felt new capability and potential in her life.**”

“One student was very eager to learn more about coding and asked for websites to practice coding at home. She is one of my lowest performers but was very confident about trying and succeeding with the Gigabots. **She came out of her shell and wasn't afraid to try any of the challenges.**”

“One student who regularly zones out in class and sometimes struggles to complete work **surprised me by how well he meshed with his group** by the last couple of lessons, taking on all of the various roles as *coder*, *botty-guard*, and *observer*. He was really excited about the choreographed dance his group set up for the Gigabot to perform and **explained to me how they did it.**”



“...It was clear early on that she hadn't had any exposure to coding, but she was fearless - when other kids gave up, she didn't.”

“[One] student was able to make **connections to new friends** sharing what he could do with a robot.”

“One student [with many identified with learning disabilities], was extremely confident and interested in all lessons. **He was able to help his group move forward and solve problems.**”

“I saw multiple girls who didn't initially want to be the *coder* start as the *coder* by the end of the Gigabot lessons.”



“The student was quiet, but after time the student became **more confident as each lesson progressed** for the fall session. The student was very creative and suggested to the group that they could make the bot dance. They succeeded in making the bot shimmy around the room. “



THANK YOU FOR YOUR INTEREST
IN STEM!