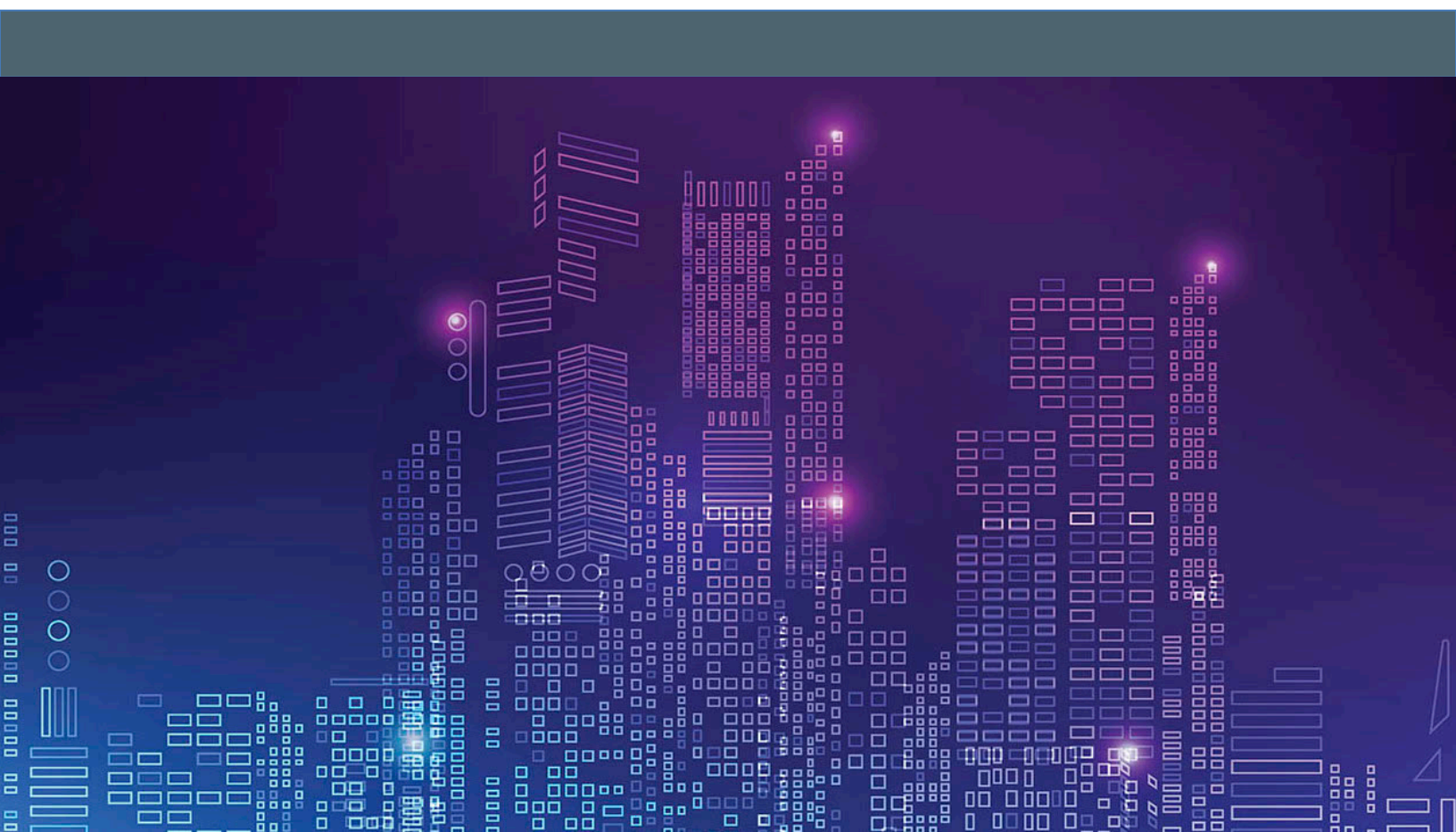# The Research Alliance for New York City Schools

Computer Science in New York City:
An Early Look at Teacher Training Opportunities and the Landscape of CS Implementation in Schools

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APPENDIX A: INTERVIEW DATA COLLECTION AND ANALYSIS

In the winter, spring, and summer of 2017, we conducted interviews with members of the New York City CS4All community, including five CS4All staff members from the NYCDOE; nine representatives of organizations on the Founders Committee; six NYCDOE CS Education Managers (CSEMs); four professional development providers from SEP, SEP Jr., and *Beauty and Joy of Computing*; and representatives from seven of the partners who provided training during the STEM Institute in the 2016-2017 school year.

Interviews were approximately one hour long and audio recorded. We created interview protocols aligned with the research questions that these different interviewees were best suited to answer. Our interviews with CS4All staff and Founders Committee members were structured using a protocol that covered the following topics:

- Vision and goals for the initiative;

- Strategies to achieve that vision;

- Challenges to achieving that vision;

- Ideas for ensuring the sustainability of the initiative; and

- Benchmarks for understanding whether CS4All is on track.

Our interviews with CSEMs and PD providers/partners, were structured using a protocol that addressed:

- Their relationships with the NYCDOE, CS4All, and the schools with which they work;

- The services and supports they provide to teachers, students, schools, and other stakeholders;

- Their goals for the work;

- Their methods for evaluating whether they are achieving those goals;

- What challenges they have faced in their work so far; and

- Strategies for overcoming those challenges.

The interview data were entered into a qualitative coding software called Dedoose. We created codes for the different sets of interviews based on the questions asked in the protocols. For the CS4All leader interviews, we established the following codes and subcodes to analyze the data:

Vision

- Federal-level vision: related to resources/funding and policy

- State-level vision: related to resources/funding and policy;

- NYCDOE vision: related to teachers, schools, administration, policy

- School administration vision: how school admin supports the initiative, or how they see CS as being important for their educational goals

Strategies

- Strategies implemented by DOE: such as policy, PD opportunities, resources (technology, funding), and Field Support Centers

- Federal-level strategies: such as policy, PD opportunities, and resources (technology, funding)

- School administration strategies: such as CS4All PD, published information (blueprint, websites), and field support centers/CSEMs

- State-level strategies: such as policy, PD opportunities, and resources (technology, funding)

- Teacher strategies: such as SEP, SEP Jr., AP CS PD, STEM Institute/integration into disciplines, exposure to CS from non-STEM Institute PD providers

- Student strategies: such as SEP, SEP Jr., AP courses, integration into disciplines from STEM Institute trained teachers, exposure to CS from teachers trained by other non-STEM Institute PD providers

Sustainability

- Issues related to District/State/Federal sustainability, such as personnel (i.e. retention, expertise), PD and pre-service preparation, practices, policy

- Issues related to School level sustainability (teacher and administrative), such as personnel (i.e. retention, expertise), PD and pre-service preparation, practices, policy

Challenges

- Related to vision

- Related to strategies

- Related to sustainability

For the CSEM and PD provider interviews, the codes and subcodes we established to analyze the data were:

<u>CS4All Implementation</u>

- Challenges to implementation: references to challenges that participants (or their organization) have encountered in the implementation of CS4All goals; references to challenges participants (or their organization) anticipate

- Challenges to PD: references to challenges/barriers that participants (or their organization) have encountered in the implementation of computer science professional development; references to challenges participants (or their organization) anticipate

- Implementation conditions: references to the scope and nature of computer science implementation by participating teachers

- PD conditions: references to the scope, nature and size of computer science professional development offered

- Measurement/benchmarks: references to benchmarks set by CSEMs, and/or PD providers to measure their respective implementation of CS4All

- Other support references to CS4All supports and services provided to schools in the implementation of the goals *other than PD*. For example: emails, Hackathons, etc.

<u>Goals</u>

- Goal-4ALL: references to the CS4All goals found in the leadership analysis: computer science for *all* students

- Goal-Equity: references to the CS4All goals found in the leadership analysis: equitable access to computer science

- Goal-Quality: references to the CS4All goals found in the leadership analysis: high-quality computer science experiences

- Goal-Sustainability: references to the CS4All goals found in the leadership analysis: sustainability beyond the 10-year initiative

PD Provider Relationships

- PD/DOE: references working relationships between CS4All PD providers and CS4All team (unless they see themselves as the same team)

- PD/School: references working relationships between PD providers and schools (admin and teachers)

- PD/Other: references working relationships between PD providers, superintendents, school boards and other organizations (e.g. nonprofits)

CSEM Relationships

- CSEM: references to working relationships between CSEMs and other CSEMs

- CSEM/DOE: references to working relationships between CSEMs and the NYCDOE CS4All team

- CSEM/School: references working relationships between CSEMs and schools (admin and teachers)

- CSEM/Other: references to working relationships between CSEMs and professional development providers, superintendents, school boards, and other organizations (e.g., nonprofits)

- Educator Reaction: references to educators' reactions to CS professional development; references to educators' reactions to other aspects of CS4All; for example, instructional goals, lesser supports, etc.

For each round of coding, our team independently coded a sample interview, discussed discrepancies, clarified definitions, and resolved differences until all agreed upon the codes assigned in the sample interview. The team then coded another interview independently and met again to discuss the coding of excerpts to ensure agreement. Team members then coded all of the interviews within each set. Once they were coded, team members each took a code, exported excerpts for that code, and wrote up a summary analytical memo describing the key issues identified by interviewees related to the subcodes within the larger codes, along with supporting quotes. These memos were then further synthesized into the analysis of stakeholder perspectives included in this report, with the core program goals and strategies as a structuring framework.

APPENDIX B: WEIGHTING IN THE LANDSCAPE SURVEY

In order to extrapolate from the group of schools that responded to the landscape survey to generalize to all NYC schools, we weighted initiative and non-initiative schools separately by superintendency. For example, in Community School District (CSD) 7, we received responses from five of the 20 non-initiative schools in that district. We weighted each respondent by a factor of four, so their responses counted as though all 20 schools had responded. Among CSD 7's three initiative schools, one completed our survey, so we weighted that response by a factor of three.

Table B-1: CS4All Landscape Survey Weight Calculation, 2016-2017 School Year

	All Schools		Schools Responding	
	Non-Initiative	Initiative	Non-Initiative	Initiative
Community School District				
CSD 1	20	1	3	0
CSD 2	43	6	2	6
CSD 3	30	2	2	1
CSD 4	23	3	6	1
CSD 5	21	2	1	2
CSD 6	39	2	6	1
CSD 7	20	5	1	3
CSD 8	34	4	4	1
CSD 9	44	4	4	2
CSD 10	55	4	7	3
CSD 11	44	3	6	2
CSD 12	32	2	4	0
CSD 13	23	4	2	3
CSD 14	21	5	1	3
CSD 15	31	6	1	1
CSD 16	18	1	4	1
CSD 17	23	8	2	5
CSD 18	18	3	2	2
CSD 19	31	3	2	2

CSD 20	30	9	1	8
CSD 21	24	5	1	2
CSD 22	30	4	2	2
CSD 23	20	3	2	1
CSD 24	37	4	4	2
CSD 25	31	3	2	1
CSD 26	22	4	1	2
CSD 27	45	4	4	1
CSD 28	32	4	4	2
CSD 29	33	3	5	3
CSD 30	36	3	2	2
CSD 31	60	10	4	6
CSD 32	17	2	2	0
High School Superintendency				
HSD Rosales	28	10	16	7
HSD Rotondo	35	7	11	2
HSD Watts	21	11	10	8
HSD Prayor	19	17	5	13
HSD Lindsey	26	14	6	8
HSD Mendez	30	15	12	9
HSD Walsh	34	12	8	8
HSD Conyers	28	19	6	14
HSD Staple	35	22	10	9
HSD Alcoff	11	5	3	2
HSD Rehfield-Pelles	35	12	7	5
Total	1289	272	188	156

Source: Research Alliance calculations based on data obtained from the NYC Department of Education.

None of the initiative schools from CSDs 1, 12, and 32 responded to the survey. Because we have no responses to weight to represent the initiative schools in these three districts, our total weighted sample covers 1,525 of the 1,558 NYC district schools serving students in grades K-12. This includes 265 of the 272 initiative schools and all 1,289 non-initiative schools.

APPENDIX C: DIFFERENCES IN THE PERCENT OF STUDENTS TAKING CS WITHIN SCHOOLS, BY GRADE BAND AND KEY STUDENT CHARACTERISTICS, 2016-2017 SCHOOL YEAR

Table C-1, below, shows the percent of students from different groups receiving CS instruction in each grade band, within schools that offer CS. For example, while a similar proportion of girls and boys in grades K-2 receive CS instruction (43.0 and 43.5 percent, respectively), there is a larger gap between the percent of girls and boys in grades 9-12 taking CS (15.5 percent and 10.6 percent, respectively. We would expect the percentages to be the same if gender differences stayed constant across grade bands.

Table C-1: Differences in the Percent of Students Taking CS Within Schools, by Grade Band and Key Student Characteristics, 2016-2017 School Year

	K-2	3-5	6-8	9-12
Gender				
Female	43.0	53.4	31.5	10.6
Male	43.5	51.7	36.0	15.5
Race/Ethnicity				
Black	41.8	50.7	28.3	13.7
Latino	39.0	48.9	31.8	12.1
Asian	47.5	55.3	34.4	14.4
White (reference)	46.8	57.7	40.2	12.9
Disability Status				
Students with Disabilities	43.9	47.4	35.4	12.8
Students without Disabilities	43.2	54.0	33.4	13.2
English Language Learner Status				
English Language Learners	41.2	46.7	32.1	9.4
Non-English Language Learners	43.7	53.6	33.9	13.6
Free/Reduced Priced Lunch Eligibility Status				
Free/Reduced Price Lunch	45.2	50.7	31.8	13.2
Not Eligible	41.4	55.0	36.4	13.0
Prior ELA Performance				
Level 1	N/A	51.2	34.0	12.3
Level 2	N/A	56.1	32.7	12.7
Level 3	N/A	57.3	34.4	14.1
Level 4	N/A	58.1	33.6	17.0
Prior Math Performance				
Level 1	N/A	52.5	31.9	11.5
Level 2	N/A	55.1	32.3	12.3
Level 3	N/A	57.3	35.2	13.5
Level 4	N/A	57.9	35.7	18.8

Source: Research Alliance calculations based on data obtained from the NYC Department of Education.

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APPENDIX D: TEACHER SURVEY METHODOLOGY

For the teacher survey, we recruited respondents from the pool of teachers that attended one of the following PDs during the 2015-2016 school year: SEP, SEP Jr., Code Interactive AP Computer Science Principles, Code Interactive Exploring Computer Science, and the STEM Institute. NYCDOE provided us with a list of the teachers, their schools, and their emails. This included 446 teachers at 241 schools, with some teachers attending multiple PDs.

We sent each teacher an individualized link to an online survey. The individualized links allowed us to target teachers who had not yet responded with follow up emails and phone calls to their schools, requesting that they complete the survey. The survey was open April 28 to July 7, 2017.

A total of 225 teachers from 159 schools responded to the survey. In each of NYC's 32 community school districts teachers from two or more schools responded, so respondents represented a broad geographical diversity. Similarly, teachers at elementary, middle, and high school levels responded, as did teachers that had attended each of the PDs listed above. The overall response rate was 50 percent.