



## THE BASICS STUDY TEACHER QUESTIONNAIRE DESCRIPTIVE STATISTICS, SPRING 2016

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### Project Overview:

The Barriers and Supports to Implementing Computer Science (BASICS) study is a three-year exploratory research project funded by the National Science Foundation (#1339256) as part of the CS10K program – an ambitious effort to have 10,000 well-trained computer science teachers in 10,000 schools. The BASICS study seeks to contribute to this effort in part by creating and sharing valid and reliable tools to measure implementation of an introductory computer science curriculum ([Exploring Computer Science, or ECS](#)) and the key supports and barriers that affect implementation. Over the course of three years, researchers at Outlier Research & Evaluation at UChicago STEM Education, a Center at the University of Chicago developed and then administered this questionnaire to students in classes using ECS in school districts across the country. BASICS is not, in any way, an evaluation of ECS. Rather, the BASICS study focused on the ECS curriculum as it is widely used to teach introductory high school computer science.

This instrument was created using an approach that built from earlier Outlier studies of instructional resource implementation. In that earlier work, Outlier developed a conceptual framework for implementation measurement that systematically organizes instructional resources into components. It also organizes the factors affecting implementation into several categories ([Century, Cassata, Rudnick & Freeman, 2012](#)). Because the questionnaires were developed with this conceptual foundation (and adapted for use with the ECS materials, informed by a group interview with the ECS developers about the main components), they can be customized for use with instructional resources beyond ECS. Please contact us for additional information.

Here we present the BASICS teacher questionnaire instrument and select descriptive statistics from the spring 2016 administration.

### **The BASICS Teacher Questionnaire**

The Spring 2016 BASICS online teacher questionnaire was the third administration to introductory computer science teachers using the ECS curriculum. Data from year 3 are presented here.

We are sharing *all* of the items used in this administration so that individuals interested in *using only subscales that demonstrated reliability* (i.e., internal consistency; see Cronbach's  $\alpha$  for each scale) can do so, while others interested in seeing or using items that were removed to improve model fit may have that option. Items that were excluded from the final subscale versions due to low factor loading or large or significant modification indices on other scales are listed below scales from which they were removed. See the [Teacher Measures PDF](#) for further **technical information** about the instrument.

#### Questionnaire Overview:

The teacher descriptive statistics are organized into three sections: (1) **implementation of the ECS curriculum**, (2) **contextual factors** that influence teacher use of the CS curriculum, and (3) **teacher socio-demographics**. The headers used here were not shown to respondents as they took the questionnaire.

#### References Cited

Century, J., Cassata, A., Rudnick, M., & Freeman, C. (2012). *Measuring Enactment of Innovations and the Factors that Affect Implementation and Sustainability: Moving Toward Common Language and Shared Conceptual Understanding*. *Journal of Behavioral Health Services & Research*. 39 (4) 343-361.

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**Please acknowledge Outlier in any publications using all or part of this instrument using the following citation:** Outlier Research & Evaluation (September, 2017). *BASICS Study Year 3 ECS Teacher Implementation and Contextual Factor Questionnaire Measures and Descriptive Statistics*. Chicago, IL; Outlier Research & Evaluation at UChicago STEM Education | University of Chicago. Retrieved from <http://outlier.uchicago.edu/basics/resources/Descriptives-TeacherImplementation/>



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## Teacher Descriptive Statistics

**Implementation** This section includes teacher report of items of instructional ECS curriculum component use (i.e., strategies teachers enact during instruction to support student learning).

### Teacher Instruction with the Exploring Computer Science (ECS) Curriculum

#### Subscales

*Teacher Facilitation of Cognitively Demanding Work* (Cronbach's  $\alpha=0.92$ )

Prompt	Items	N	M	SD
In what percentage of class sessions using <i>[display logic to show name of most recently completed unit]</i> did you explicitly do the following?	Consider alternative approaches to their work.	186	56.25	29.39
	Analyze (organize, process, manipulate, evaluate) data.	186	60.42	29.09
	Explain the logic and reasoning supporting their solutions.	186	62.37	29.87
	Explain why they agree or disagree with the work of other students.	186	47.41	30.06
	<b>Scale Average</b>	<b>186</b>	<b>57.50</b>	<b>25.20</b>
<i>Excluded Item:</i> Problem solve when something doesn't work the way they want it to work.				
Response scale: Bar slider scale range (set to select by 10% increments): 0 – 100%				

Note: Item was removed in CFA analysis because it loaded significantly on additional factors (*Student Interest*, *Students Taking Risks*, and *Student Autonomy*) (see the technical information for details).

*Teacher Facilitation of Student Interest* (Cronbach's  $\alpha=0.91$ )

Prompt	Items	N	M	SD
In what percentage of class sessions using <i>[display logic to show name of most recently completed unit]</i> did you	Connected lessons or activities to students' lives (e.g., by asking about past experiences, or applying content to students' daily lives).	183	57.12	29.91
	Asked students to consider relationships between lesson content and real world problems (meaning actual events or situations within or outside of school).	183	62.70	29.00

explicitly do the following?	Engaged student interest by connecting lesson content with current events.	183	57.07	30.37
	Engaged student interest through other means (e.g., telling an interesting story, using humor, bringing in a guest speaker).†	183	59.92	30.50
	<b>Scale Average</b>	<b>183</b>	<b>59.20</b>	<b>26.47</b>
Response scale: Bar slider scale range (set to select by 10% increments): 0 – 100%				

*Teacher Facilitation of Students Taking Intellectual and Emotional Risks (Cronbach's  $\alpha=0.94$ )*

Prompt	Items	N	M	SD
In what percentage of class sessions using <i>[display logic to show name of most recently completed unit]</i> did you explicitly do the following?	Encouraged students to answer questions even if they were not sure they were correct.	179	77.59	27.61
	Encouraged students to take risks in trying new things even if they might make mistakes.	179	81.79	24.62
	Encouraged students to ask questions if they didn't understand something.	179	83.99	24.96
	Urged students to ask peers they didn't know well for help.	179	80.91	25.56
	Encouraged students to share ideas if they were different from others.†	179	79.36	25.65
	<b>Scale Average</b>	<b>179</b>	<b>80.73</b>	<b>23.21</b>
Response scale: Bar slider scale range (set to select by 10% increments): 0 – 100%				

*Teacher Facilitation of Student Autonomy (Cronbach's  $\alpha=0.88$ )*

Prompt	Items	N	M	SD
In what percentage of class sessions using <i>[display logic to show name of most</i>	Intentionally stepped back so students could determine how to figure out answers/solutions on their own.	178	75.99	23.79
	Gave students choices that significantly shaped their learning experiences.	178	67.54	26.53

<i>recently completed unit</i> ] did you explicitly do the following?	Gave students opportunities to work without my participation or input during instructional time.	178	74.92	22.01
	Gave students activities that required them to manage their own time.	178	77.17	21.99
	<b>Scale Average</b>	<b>178</b>	<b>73.92</b>	<b>20.48</b>
<i>Excluded Item:</i> Provided opportunities for students to set their own goals for learning computer science.†				
Response scale: Bar slider scale range (set to select by 10% increments): 0 – 100%				

*Teacher Facilitation of Small Group Participation (Cronbach's  $\alpha=0.86$ )*

Prompt	Items	N	M	SD
In what percentage of class sessions using [ <i>display logic to show name of most recently completed unit</i> ] did you explicitly do the following while students worked in small groups?	Encouraged all group members to contribute (verbally or nonverbally).	173	78.19	28.76
	Ensured all group members understood the task at hand.	172	76.08	27.60
	Divided the group member roles/duties (e.g., note taker, reader, coder, reviewer, presenter, facilitator, etc.)†	173	78.76	27.81
	<b>Scale Average</b>	<b>174</b>	<b>77.09</b>	<b>27.30</b>
<i>Excluded Item:</i> Encouraged cooperative work among students.				
Response scale: Bar slider scale range (set to select by 10% increments): 0 – 100%				

*Teacher Use of Assessment to Inform Instruction (Cronbach's  $\alpha=0.88$ )*

Prompt	Items	N	M	SD
In what percentage of class sessions	Changed my instructional approach based on students' class work and/or responses.	180	61.49	27.01

using <i>[display logic to show name of most recently completed unit]</i> did you explicitly do the following?	Suggested alternate problem-solving strategies based on students' class work and/or responses.†	179	62.18	27.10
	Revisited concepts based on students' class work and/or responses.	180	61.62	28.02
	<b>Scale Average</b>	<b>180</b>	<b>61.76</b>	<b>24.59</b>
Response scale: Bar slider scale range (set to select by 10% increments): 0 – 100%				

**Contextual Factors** This section includes items that measure the presence of a range of factors that can influence teacher use of computer science curriculum components. These include factors related to: a) teaching in general, b) teaching computer science specifically, and c) teaching computer science with the ECS curriculum.

## Teaching in General

### Subscales

*Teacher Resourcefulness and Coping* (Cronbach's  $\alpha=0.80$ )

Prompt	Items	N	M	SD
How much do you agree or disagree with the following statements?	I see difficult tasks through to the end	180	5.39	0.74
	I find ways to accomplish my goals	180	5.46	0.58
	When planning for my work, I prepare for potential challenges	180	5.16	0.70
	I am able to manage my work even when there are unexpected changes and constraints.	180	5.29	0.68
	<b>Scale Average</b>	<b>180</b>	<b>5.32</b>	<b>0.54</b>

*Excluded Item:*

I am able to manage the pressure and stress at my school well.

Response scale: 1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree

*Teacher Innovativeness (Cronbach's  $\alpha=0.81$ )*

Prompt	Items	N	M	SD
How much do you agree or disagree with the following statements?	I experiment with new practices all the time.	180	5.04	0.78
	I am always looking for new ways of doing things in my teaching.	180	5.28	0.73
	I am constantly the first to try new things in my school.	180	4.73	1.03
	<b>Scale Average</b>	<b>180</b>	<b>5.01</b>	<b>0.73</b>
Response scale: 1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree				

*Teaching Ability Beliefs (Cronbach's  $\alpha=0.75$ )*

Prompt	Items	N	M	SD
How much do you agree or disagree with the following statements?	I have nearly every skill I need to teach well.	180	4.12	1.13
	I am a very effective teacher.	180	4.86	0.76
	I am one of the best high school teachers I know.	180	4.03	1.13
	<b>Scale Average</b>	<b>180</b>	<b>4.35</b>	<b>0.85</b>
Response scale: 1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree				

## Teaching Computer Science

### Subscales

*Attitude toward teaching with Computer Science Curriculum<sup>\*^</sup> (Cronbach's  $\alpha=0.86$ )*

Prompt	Items	N	M	SD
How much do you agree or disagree with the following statements?	I don't like teaching introductory computer science with curriculum materials I didn't develop myself.†	180	2.29	1.11
	Teaching with a set curriculum makes me feel restricted in how I teach introductory computer science.†	180	2.55	1.24

	I don't like teaching introductory computer science with a set curriculum.	180	2.32	1.20
	<b>Scale Average</b>	<b>180</b>	<b>4.62</b>	<b>1.05</b>
Response scale: 1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree				

\* Subscale excluded from final second-order Contextual Factor/Attitude model.

^ All items in this scale are negatively-worded and require reverse-coding in analysis.

*Computer Science Teaching Ability Beliefs (Cronbach's  $\alpha=0.87$ )*

Prompt	Items	N	M	SD
How much do you agree or disagree with the following statements about teaching introductory computer science?	I understand computer science concepts well enough to be a very effective teacher of introductory computer science.	179	4.84	1.03
	I have nearly every skill I need to teach introductory computer science well.	179	4.38	1.18
	I am really good at teaching introductory computer science. †	180	4.47	1.04
	<b>Scale Average</b>	<b>180</b>	<b>4.57</b>	<b>0.97</b>
Response scale: 1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree				

*Teacher Perception of the Cognitive Demand in Computer Science (Cronbach's  $\alpha=0.89$ ) \*†*

Prompt	Items	N	M	SD
How much do you agree or disagree with the following statements about computer science? Learning computer science can help students learn how to...	Consider alternative approaches to their work.	180	5.14	0.72
	Analyze (organize, process, manipulate, evaluate) data.	180	5.31	0.71
	Explain the logic and reasoning supporting their solutions.	180	5.29	0.70
	Communicate their thought processes to others.	180	5.14	0.71
	Problem solve when something doesn't work the way they want it to work.	180	5.36	0.69
	Persist when schoolwork is difficult.	180	5.06	0.88
	<b>Scale Average</b>	<b>180</b>	<b>5.22</b>	<b>0.58</b>



<i>Excluded Item:</i> Explain why they agree or disagree with the work of other students.
Response scale: Response scale: <i>1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree</i>

\*Subscale not included in final second-order Contextual Factor/Attitude model.

*Teacher Perception of the Value of Computer Science Learning - Skills (Cronbach's  $\alpha=0.82$ ) \*†*

Prompt	Items	N	M	SD
How much do you agree or disagree with the following statements about computer science? Learning computer science can help...	Develop students' math skills.	180	4.82	0.86
	Develop students' science skills.	180	4.71	0.87
	Develop students' literacy skills.	180	4.92	0.83
	Develop students' digital citizenship skills.	180	5.17	0.79
	<b>Scale Average</b>	<b>180</b>	<b>4.90</b>	<b>0.67</b>

<i>Excluded Item:</i> Increase students' engagement in their schoolwork
Response scale: <i>1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree</i>

\*Subscale not included in final second-order Contextual Factor/Attitude model.

## Descriptive items

### *Beliefs About Requiring Computer Science*

Prompt	Items	N	%
Select the one statement that best aligns with your opinion about school/district policies for offering introductory computer science in high schools.	Introductory computer science should be required for <b>all</b> high school students.	102	56.7
	Introductory computer science should only be required for <b>some</b> high school students (e.g., students in a CTE program or school "majors," "pathways," or "clusters" with CS requirements).	18	10.0
	Introductory computer science should only be offered as an elective, but one that is strongly encouraged for high school students (i.e., hold elective status, but highly encouraged, like taking a 4 <sup>th</sup> year of mathematics).	44	24.4
	Introductory computer science should only be offered to high school students as part of the regular electives options (i.e., not	12	6.7

	encouraged more than any other electives options).		
	None of these statements align with my opinions about introductory computer science.	4	2.2
	<b>Total</b>	<b>180</b>	<b>100</b>

## Teaching Computer Science with the ECS Curriculum

### Descriptive items

#### *Teacher Perception of Curriculum Fit with Student Needs*

Prompt	Items	N	M	SD
The ECS materials are a perfect fit for my students...	Academic needs.	180	4.27	1.10
	Cultural identity and background.	180	4.26	1.22
	College and career pathway needs.	180	4.48	1.07
	Learning differences.	180	4.62	0.97
	<b>Scale Average</b>	<b>180</b>	<b>4.41</b>	<b>0.92</b>

Response scale: 1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree

#### *Understanding of the Curriculum*

Prompt	Items	N	M	SD
How much do you agree or disagree with the following?	Overall, I completely understand the learning objectives.	180	4.83	0.88
	Overall, I completely understand the teaching strategies I am supposed to use in the curriculum.	180	4.86	0.95
	<b>Scale Average</b>	<b>180</b>	<b>4.85</b>	<b>0.86</b>

Response scale: 1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree

#### *Desire to Continue Using the Curriculum*

Prompt	Items	N	M	SD
I would love to teach introductory computer science	I would love to teach introductory computer science with ECS materials every year.	177	4.80	1.222

with ECS materials every year.			
Response scale: 1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree			

## School/Organizational Structures

### Descriptive items

#### Reason for Teaching Computer Science

Item	Response Options <sup>1</sup>	N	%
Which of the following is most true for you? Select only one.	I volunteered to teach a class using ECS materials this school year.	109	61.2
	I was asked/required to teach a class with ECS materials this school year.	69	38.8
	<b>Total</b>	<b>178</b>	<b>100</b>

<sup>1</sup>Select only one response.

#### School/District Computer Science Requirement

Items	Response Options	N	%
Some or all students at my school are required to take introductory computer science.	Yes	35	19.55
	No	144	80.45
	<b>Total</b>	<b>279</b>	<b>100</b>
[If "YES" to above] Which students in your school are required to take introductory computer science? Select all that apply to your school.	All freshmen	18	34.62
	All sophomores	12	23.08
	All juniors	6	11.54
	All seniors	9	17.31
	All CTE students in a CS/IT-focused program strand	2	3.85
	Other: [open response]	5	9.62
	<b>Total</b>	<b>52</b>	<b>100.00</b>

*Student Demand for Computer Science*

<b>Prompt</b>	<b>Item</b>	<b>N</b>	<b>M</b>	<b>SD</b>
We would like to know your perception of the student experience with enrolling in introductory level computer science courses at your school. How much do you agree or disagree with the following statement??	There is student demand for more computer science courses in my school.	179	4.39	1.12
Response scale: 1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree				

*Community Values/Perceptions of Supports for Computer Science*

<b>Prompt</b>	<b>Items</b>	<b>N</b>	<b>M</b>	<b>SD</b>
How much do you agree or disagree with the following statements about the leaders and community members around you?	My school leaders tell others in our school about the benefits of offering introductory computer science for students.	179	4.36	1.56
	Counselors at my school communicate the benefits of computer science to all students.	179	4.02	1.59
	Families here think offering computer science is important.	179	4.53	1.51
	Community leaders (political leaders, clergy, other) here think offering computer science courses is important.	179	4.93	1.53
	Other local stakeholders (business, higher education, other) here think offering computer science courses is important.	179	5.20	1.32
	<b>Scale Average</b>		179	4.61
Response scale: 1-Strongly Disagree, 2-Disagree, 3-Somewhat Disagree, 4-Somewhat Agree, 5-Agree, 6-Strongly Agree				

**Teacher Socio-Demographics** These items ask about the characteristics of teachers that potentially influence how they implement ECS in their classroom.

**Descriptive items**

*Teaching Background*

Item	Response Options (summarized)	N	%
Including this year, how many years have you been teaching?	1-5 years	41	23.1
	6-10 years	42	23.7
	11-15 years	36	20.4
	16-20 years	25	14.1
	21+ years	33	18.6
	<b>Total</b>	<b>177</b>	<b>100</b>

*Teaching with Exploring Computer Science*

Item	Response Options	N	%
Including this year, how many years have you been teaching introductory computer science using Exploring Computer Science (ECS) materials?	1 (this is my first year teaching with ECS)	115	65
	2	40	23
	3	9	5
	4	5	3
	5	3	2
	6	0	0
	7	1	1
	8+	4	2.3

	<b>Total</b>	<b>177</b>	<b>100</b>
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### Teaching Other Subjects

Item	Response Options	N
During the 2015-2016 academic year, which subjects have you taught? Select all that apply.	I only teach introductory computer science with the ECS materials	11
	AP Computer Science A	25
	AP Computer Science Principles (CSP)	36
	Other computing courses (For example, Networking, Databases, Web Design, Programming, Security, IT, Computer Engineering).	71
	Keyboarding or software applications-focused courses (including Microsoft Office)	50
	Art, Music, or a Foreign Language	8
	Business	46
	English/Language Arts	3
	Social Sciences/History	6
	Health, Physical education, or Life-Skills	1
	Mathematics	42
	Science	12
	Other: [Open response]	41
<b>Total</b>	<b>352</b>	

Note: N adds up to more than the number of teachers because respondents could select as many responses as applied.

### Computer Science Background

Items	Response Options (summarized)	N	%
How many college level computer science courses have you completed?	0/No courses	56	31.5
	1-3	69	38.8
	4-6	25	14
	7-9	5	2.8

	10+	23	12.9
	<b>Total</b>	<b>178</b>	<b>100</b>
Do you have any computer science certifications or endorsements?	Yes	133	75.1
	No	44	24.9
	<b>Total</b>	<b>178</b>	<b>100</b>
Do you have experience working in the computer science industry as a professional?	Yes	130	73.0
	No	48	27.0
	<b>Total</b>	<b>178</b>	<b>100</b>
How much professional development on teaching computer science did you have before participating in the ECS professional development sessions?	None	37	20.8
	Some	96	53.9
	A Lot	44	24.7
	<b>Total</b>	<b>177</b>	<b>100</b>

#### *General Education Background*

<b>Items</b>	<b>Response Options</b>	<b>N</b>	<b>%</b>
	Bachelor's Degree	51	28.8
	Master's Degree	116	65.5
	Doctoral or Professional Degree (PhD, EdD, MD, JD, etc.)	10	5.6
	<b>Total</b>	<b>177</b>	<b>100</b>
In what area is your primary undergraduate degree? Select only one.	Art Music, or Foreign Language	4	2.2
	Business	60	33.7
	Computer Science	10	5.6
	Education	23	12.9

Engineering	5	2.8
English/Language Arts	3	1.7
Mathematics	32	18.0
Science	12	6.7
Social Sciences	12	6.7
Other: (Write in)	17	9.6
<b>Total</b>	<b>178</b>	<b>100</b>

*Teacher Characteristics: Age*

Item	Response Options (summarized)	N	%
What is your age?	24-48 years	16	9.2
	29-33	24	13.8
	34-38	27	15.5
	39-43	23	13.2
	44-48	25	14.4
	49-53	22	12.6
	54+	37	21.3
	<b>Total</b>	<b>174</b>	<b>100</b>

*Teacher Characteristics: Gender Identity*

Item	Response Options	N	%
What is your gender identity?	Male	93	52.2
	Female	81	45.5
	Other	1	0.6
	Prefer not to answer	3	1.7
	<b>Total</b>	<b>178</b>	<b>100</b>

*Teacher Characteristics: Racial/Ethnic Identity*

Item	Response Options	N	%
Which of the following best represents your racial and/or	American Indian or Alaska Native	0	0



ethnic identity? Select all that apply.	Asian	8	5
	Black or African American	19	11
	Hispanic or Latino/Latina	10	6
	Native Hawaiian or Other Pacific Islander	1	1
	White	122	71
	Multiple categories	3	2
	Other	8	5
	<b>Total</b>	<b>171</b>	<b>100</b>

*School Background Information*

Item	Response Options	N
What type of school do you teach in? (Check all that apply)	Public neighborhood/in boundary school	146
	Private school	4
	Selective enrollment school	8
	School with a computer science/IT CTE program	26
	Charter school.	7
	Alternative school	8
	Other	8
	<b>Total</b>	<b>207</b>

Note: N adds up to more than the number of teachers because respondents could select as many responses as applied.

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† The Year 3 (spring 2016) BASICS instrument included these subscales/items for the first time. Items grouped as scales showed strong internal consistency and performance in CFA analyses; we recognize that future work can further validate these scales with more samples of high school students.