[BASICS] THE BASICS STUDY TEACHER QUESTIONNAIRE MEASURES, SPRING 2016

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 teachers 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.

Over the course of questionnaire development, the instrument was reviewed to assess content validity and usability by an ECS team member and several ECS teachers, and administered three times to teachers of introductory computer science classes using the Exploring Computer Science curriculum. The first administration (Spring 2014) was a pilot with a sample too small to perform psychometric analysis (n=24). The remaining two rounds included enough respondents to perform psychometric analysis to achieve optimal reliability and validity (n=205 usable responses in Spring 2015 and n=178 in Spring 2016).

We are sharing *all* of the items used in the final administration so that individuals interested in *using only subscales that demonstrated reliability* (i.e., internal consistency; see Cronbach's α 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. **Technical information** about the instrument is included at the end of this document.

Questionnaire Overview:
The questionnaire is organized into four sections: (1) items for capturing **school/class background information**, (2) items and scales for measuring **implementation of the ECS curriculum** (i.e., teacher report of how the ECS materials are used in practice), (3) items and scales for measuring **contextual factors** that influence teacher use of the CS curriculum, and (4) items for capturing **teacher socio-demographics**. The headers used here were not shown to respondents as they took the questionnaire.

Select implementation of the ECS curriculum, contextual factor, and teacher socio-demographic **descriptive statistics** from our 2016 administration of this questionnaire are available here.

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.

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

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The Teacher Instrument

School/Class Background Information

Descriptive items in this section capture general background information about the school and classroom.

Teaching with ECS Materials

Items	Response Options
Are you teaching an introductory computer science class using ANY of the Exploring Computer Science (ECS) materials this school year?	Yes
	No [1]

[1] If "NO" was selected, teachers were taken to the end of the survey. This initial question was used to ensure our survey sample only included teachers who were using at least some of the ECS instructional materials in their classroom in the current school year.

School Background Information

Items	Response Options
Please indicate the school district in which you teach.	[List school districts for your study]
What is the name of your school?	[List school names for your study and a "My school is not on the list" option] [1]
What type of school do you teach in? (Check all that apply)	[List types of school options, e.g. public neighborhood, private school, selective enrollment school, charter school, school with a computer science/IT CTE program, etc.]

[1] If "My school is not on the list" was selected, participants were prompted to write in the name of their school. Note, if you plan to administer this student questionnaire along with the corresponding BASICS teacher questionnaire with the intent of linking student responses to their classroom teacher's responses, a school name question will be needed.

Note: If you plan to administer the questionnaire to teachers who may teach **multiple** sections of introductory computer science, we suggest framing the items by asking teachers to consider only **one individual class section** as they respond to the all of the **school/class background** and **implementation** items and adjust the wording of the items accordingly. We feel that asking teachers to think about one particular class section/group of students will yield a more accurate representation of implementation.

Class Background Information: Sections

Item	Response Options
How many different introductory computer science sections (groups of students) that use ECS materials do you teach?	1
	2
	3
	4
	5
	6 or more
[Instructions/Prompts for Teachers Based on Response to Above Question]	
If a teacher responds **1** to this item, the remaining items adjust to use the words "this section" (e.g. "How many students do you have in **this section**?")	
If a teacher responds **2 or more**, they are shown the following instructions: *"You indicated that you teach more than one group/section of students using ECS materials. When answering the following questions, think about only one of these sections (group of students) and answer all following questions for that one section/group of students only.* ***For the purposes of this questionnaire, we'll refer to this one section/group of your students as "ECS section A."*** The remaining items adjust to use the words, "ECS section A" (e.g. "How many students to you have in **ECS section A**?").	

Note: For ease in reading scales and items below, we show the prompts that were used for teachers who indicated teaching only **one section of introductory computer science** in the item above.

Class Background Information: Students

Items	Response Options
How many students do you have in this section?	1-5
	6-10
	11-15
	16-20
	21-25
	26-30
	30-35
	36+
In what grade(s) are the students in this section? Select all that apply.	9th
	10th
	11th
	12th

Session Frequency: Days

Item	Response Options
How many days a week does this section meet?	1
	2
	3
	4
	5
	Schedule that doesn't match the above options
	If you have a schedule that doesn't match any of the above, please use this space to explain: [open response]

Session Frequency: Minutes

Item	Response Scale
On average, how many minutes does this section last (i.e., what is the designated time in the school schedule)? Please drag the slider to the appropriate number of minutes.	[Bar slider scale range (set to select by 15-minute increments): 15 minutes – more than 3 hours.]

Implementation This section includes teacher report of items of: a) structural ECS curriculum component implementation (e.g., units completed/lessons omitted, number of weeks on each unit, lesson order, etc.) and b) instructional ECS curriculum component use (i.e., strategies teachers enact during instruction to support student learning).

Implementation of Structural Exploring Computer Science (ECS) Curriculum Components

Descriptive items

Unit Currently Teaching

Item	Response Options
First, tell us the name of the unit you are **currently teaching** in this class (i.e., you are teaching lessons from this unit right now, and are not yet done with this unit).	Unit 1: Human Computer Interaction
	Unit 2: Problem Solving
	Unit 3: Web Design
	Unit 4: Introduction to Programming
	Unit 5: Computing and Data Analysis
	Unit 6: Robotics or Mobile Application Development
	I am not currently teaching an ECS unit

Unit Completion: All Completed Units

Item	Response Options
Which ECS units did you completed **prior to completing the unit you are currently teaching**? Do not include the unit you are currently teaching *[display logic to show name of unit currently teaching]*. Check all that apply.	Unit 1: Human Computer Interaction
	Unit 2: Problem Solving
	Unit 3: Web Design
	Unit 4: Introduction to Programming
	Unit 5: Computing and Data Analysis
	Unit 6: Robotics or Mobile Application Development

Lessons Omitted: All Completed Units

Prompt	Items	Response Options
About how many lessons in each completed unit did you omit for any reason?	*[Display logic to show unit names and response options for each unit selected as completed]*	None
		1 lesson
		2-3 lessons
		4-5 lessons
		6-7 lessons
		8-10 lessons
		11 or more lessons

Unit Duration: All Completed Units

Prompt	Items	Response Options
About how many weeks did you spend on each unit?	*[Display logic to show unit names and response options for each unit selected as completed]*	1 week
		2 weeks
		3 weeks
		4 weeks
		5 weeks
		6 weeks
		7 weeks
		8 weeks
		9 weeks
		10 or more weeks

Unit Completion: Most Recently Completed Unit

Item	Response Options
Now tell us which of these units you **completed most recently**?	*[Display logic to show each unit selected as completed]*

Lesson Order: Most Recently Completed Unit

Item	Response Options
In this recently completed unit [*display logic to show name of most recently completed unit*], did you do the unit lessons in order (skipping a lesson does not count as doing it out of order)?	I did all of the lessons in order
	I did a couple of lessons out of order (1-2)
	I did a lot of lessons out of order (more than 3)

Student Grouping Strategies: Most Recently Completed Unit

Prompt	Items	Response Scale
In what percentage of class sessions using [*display logic to show name of most recently completed unit*] did you organize students in the following ways?	Partner work (e.g., 2 students)	[Bar slider scale range (set to select by 10% increments): 0 – 100%]
	Small group work (e.g., 3 of more students)	
	Whole class work	
	Independent	

Teacher Instruction with the Exploring Computer Science (ECS) Curriculum

Subscales

Facilitation of Cognitively Demanding Work (Cronbach's α=0.92)

Prompt	Items	Response Scale
In what percentage of class sessions using [*display logic to show name of most recently completed unit*] did you explicitly do the following?	Consider alternative approaches to their work.	[Bar slider scale range (set to select by 10% increments): 0 – 100%]
	Analyze (organize, process, manipulate, evaluate) data.	
	Explain the logic and reasoning supporting their solutions.	
	Explain why they agree or disagree with the work of other students.	

Excluded Item:
Problem solve when something doesn't work the way they want it to work.

Teacher Facilitation of Student Interest (Cronbach's α=0.91)

Prompt	Items	Response Scale
In what percentage of class sessions using [*display logic to show name of most recently completed unit*] did you explicitly do the following?	Connected lessons or activities to students' lives (e.g., by asking about past experiences, or applying content to students' daily lives).	[Bar slider scale range (set to select by 10% increments): 0 – 100% set to select by 10%]
	Asked students to consider relationships between lesson content and real world problems (meaning actual events or situations within or outside of school).	
	Engaged student interest by connecting lesson content with current events.	
	Engaged student interest through other means (e.g., telling an interesting story, using humor, bringing in a guest speaker).†	

Teacher Facilitation of Students Taking Intellectual and Emotional Risks (Cronbach's α=0.94)

Prompt	Items	Response Scale
In what percentage of class sessions using [*display logic to show name of most recently completed unit*] did you explicitly do the following?	Encouraged students to answer questions even if they were not sure they were correct.	[Bar slider scale range (set to select by 10% increments): 0 – 100% set to select by 10%]
	Encouraged students to take risks in trying new things even if they might make mistakes.	
	Encouraged students to ask questions if they didn't understand something.	
	Urged students to ask peers they didn't know well for help.	
	Encouraged students to share ideas if they were different from others.†	

Teacher Facilitation of Student Autonomy (Cronbach's α=0.88)

Prompt	Items	Response Scale
In what percentage of class sessions using [*display logic to*	Intentionally stepped back so students could determine how to figure out answers/solutions on their own.	[Bar slider scale range (set to select by 10% increments): 0 – 100%]

show name of most recently completed unit] did you explicitly do the following?	Gave students choices that significantly shaped their learning experiences.	
	Gave students opportunities to work without my participation or input during instructional time.	
	Gave students activities that required them to manage their own time.	

Excluded Item:
Provided opportunities for students to set their own goals for learning computer science.†

Teacher Facilitation of Small Group Participation (Cronbach's α=0.86)

Prompt	Items	Response Scale
In what percentage of class sessions using [*display logic to show name of most recently completed unit*] did you explicitly do the following while students worked in small groups?	Encouraged all group members to contribute (verbally or nonverbally).	[Bar slider scale range (set to select by 10% increments): 0 – 100%]
	Ensured all group members understood the task at hand.	
	Divided the group member roles/duties (e.g., note taker, reader, coder, reviewer, presenter, facilitator, etc.)†	

Excluded Item:
Encouraged cooperative work among students.

Teacher Use of Assessment to Inform Instruction (Cronbach's α=0.88)

Prompt	Items	Response Scale
In what percentage of class sessions using [*display logic to show name of most recently completed unit*] did you explicitly do the following?	Changed my instructional approach based on students' class work and/or responses.	[Bar slider scale range (set to select by 10% increments): 0 – 100% set to select by 10%]
	Suggested alternate problem-solving strategies based on students' class work and/or responses.†	
	Revisited concepts based on students' class work and/or responses.	

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 α=0.80)

Prompt	Items	Response Scale
How much do you agree or disagree with the following statements?	I am able to manage the pressure and stress at my school well.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	I see difficult tasks through to the end.	
	I find ways to accomplish my goals.	
	When planning for my work, I prepare for potential challenges.	
	I am able to manage my work even when there are unexpected changes and constraints.	

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

Teacher Innovativeness (Cronbach's α=0.81)

Prompt	Items	Response Scale
How much do you agree or disagree with the following statements?	I experiment with new practices all the time.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	I am always looking for new ways of doing things in my teaching.	
	I am constantly the first to try new things in my school.	

Teaching Ability Beliefs (Cronbach's α=0.75)

Prompt	Items	Response Scale
How much do you agree or disagree with the following statements?	I have nearly every skill I need to teach well.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	I am a very effective teacher.	
	I am one of the best high school teachers I know.	

Teaching Computer Science

Subscales

Attitude toward teaching with Computer Science Curriculum[*^] (Cronbach's α=0.86)

Prompt	Items	Response Scale
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.†	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	Teaching with a set curriculum makes me feel restricted in how I teach introductory computer science.†	
	I don't like teaching introductory computer science with a set curriculum.	

[*] 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 α=0.87)

Prompt	Items	Response Scale
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.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	I have nearly every skill I need to teach introductory computer science well.	
	I am really good at teaching introductory computer science.†	

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

Prompt	Items	Response Scale
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.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	Analyze (organize, process, manipulate, evaluate) data.	
	Explain the logic and reasoning supporting their solutions.	
	Communicate their thought processes to others.	
	Problem solve when something doesn't work the way they want it to work.	
	Persist when schoolwork is difficult.	

Excluded Item:
Explain why they agree or disagree with the work of other students.

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

Teacher Perception of the Value of Computer Science Learning – Skills (Cronbach's α=0.82) *†

Prompt	Items	Response Scale
How much do you agree or disagree with the following statements about computer science? Learning computer science can help...	Develop students' math skills.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	Develop students' science skills.	
	Develop students' literacy skills.	
	Communicate their thought processes to others.	
	Develop students' digital citizenship skills.	
	Persist when schoolwork is difficult.	

Excluded Item:
Increase students' engagement in their schoolwork

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

Descriptive items

Beliefs About Requiring Computer Science

Item	Response Options
Select the one statement that best	Introductory computer science should be required for all high school students.

aligns with your opinion about school/district policies for offering introductory computer science in high schools.	Introductory computer science should only be required for some high school students (e.g., students in a CTE program or school "majors," "pathways," or "clusters" with CS requirements).
	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 4th year of mathematics).
	Introductory computer science should only be offered to high school students as part of the regular electives options (i.e., not encouraged any more than any other electives options).
	None of these statements align with my opinions about introductory computer science.
	[If "None of these statements align…" was selected]: Please explain your opinion about school/district policies for offering introductory computer science in high schools [open response]

Teaching Computer Science with the ECS Curriculum

Descriptive items

Teacher Perception of Curriculum Fit with Student Needs

Prompt	Items	Response Scale
The ECS materials are a perfect fit for my students…	Academic needs.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	Cultural identity and background.	
	College and career pathway needs.	
	Learning styles or differences.	

Understanding of the Curriculum

Prompt	Items	Response Scale
How much do you agree or disagree with the following?	Overall, I completely understand the ECS learning objectives.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	Overall, I completely understand the teaching strategies I am supposed to use in the ECS curriculum.	

Desire to Continue Using the Curriculum

Prompt	Items	Response Scale
How much do you agree or disagree with the following?	I would love to teach introductory computer science with ECS materials every year.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree

Professional Development Learning Opportunities[1]

Items	Response Scale
How many days did you attend summer professional development sessions this school year about the use of ECS materials?	None
	Some
	Most
	All
How many days did you attend the school year professional development about the use of ECS materials?	None
	Some
	Most
	All

Prompt	Items	Response Scale
How much do you agree or disagree with the following?	The professional development sessions for ECS have significantly improved my ability to teach computer science content.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	The professional development sessions for ECS provided me with everything I need to know to teach the program.	
	The professional development sessions for ECS have prepared me well to use inquiry in my classroom.	
	The professional development sessions for ECS have significantly improved my ability to account for equity in my computer science classroom.	

[1] Used on Year 2 survey.

School/Organizational Structures

Descriptive items

Reason for Teaching Computer Science

Item	Response Options[1]
Which of the following is most true for you? Select only one.	I volunteered to teach a class using ECS materials this school year.
	I was asked/required to teach a class with ECS materials this school year.

[1] Select only one response.

School/District Computer Science Requirement

Items		Response Options
Some or all students at my school are required to take introductory computer science.		Yes
		No
[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	
	All sophomores	
	All juniors	
	All seniors	
	All CTE students in a CS/IT-focused program strand	
	Other: [open response]	

Student Demand for Computer Science

Prompt	Item	Response Scale
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.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree

Community Values/Perceptions of Supports for Computer Science

Prompt	Items	Response Scale
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.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	Counselors at my school communicate the benefits of computer science to all students.	
	Families here think offering computer science is important.	
	Community leaders (political leaders, clergy, other) here think offering computer science courses is important.	
	Other local stakeholders (business, higher education, other) here think offering computer science courses is important.	

Locus of Decision-Making[1]

Prompt	Items	Response Scale
We are interested in knowing how involved you are in decisions about computer science in your school. How much do you agree or disagree with the following statements?	I am involved in school decisions about computer science education.	1 – Strongly Disagree 2 – Disagree 3 – Disagree Somewhat 4 – Agree Somewhat 5 – Agree 6 – Strongly Agree
	I am one of the main decision makers about computer science education in my school.	
	I have little say about computer science education in my school.	
	I wish I were more involved in decisions about computer science education in my school.	

[1] Used on Year 1 survey. Given the Year 1 sample was too small to perform psychometric analysis on these items as a scale, we present them here as a "descriptive" set of items about school-level decision-making.

Supports for Teaching Computer Science

Item	Response Options
Please briefly describe your three most important supports for teaching computer science with ECS.	1. [open response]
	2. [open response]
	3. [open response]

Barriers to Teaching Computer Science

Item	Response Options
Please briefly describe your three biggest barriers to teaching computer science with ECS.	1. [open response]
	2. [open response]
	3. [open response]

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 Scale
Including this year, how many years have you been teaching?		[List out all options: 1 (this is my first year teaching) – 30+]
Including this year, how many years have you been teaching introductory computer science using Exploring Computer Science (ECS) materials?		[List out all options: 1 (this is my first year teaching with ECS) – 8]
Prompt	**Items**	**Response Scale**
Including this year, indicate the number of years that you have taught the following:	AP Computer Science A	[List out all options: 1 (this is my first year this course/type of course) – 10+)
	AP Computer Science Principles (CSP)	
	Computing courses other than ECS, AP CSP, or AP CS A (For example, Networking, Databases, Web Design, Programming, Security, IT, Computer Engineering).	
	Keyboarding or software applications-focused courses (including Microsoft Office)	
Item		**Response Options**
During the *[insert year here]* academic year, which subjects have you taught? Select all that apply.		I only teach introductory computer science with the ECS materials
		AP Computer Science A

	AP Computer Science Principles (CSP)
	Other computing courses (For example, Networking, Databases, Web Design, Programming, Security, IT, Computer Engineering).
	Keyboarding or software applications-focused courses (including Microsoft Office)
	Art, Music, or a Foreign Language
	Business
	English/Language Arts
	Social Sciences/History
	Health, Physical education, or Life-Skills
	Mathematics
	Science
	Other: [Open response]

Computer Science Background

Items	**Response Options**
How many college level computer science courses have you completed?	[List out all options: 0 – 10 or more]
Do you have any computer science certifications or endorsements?	Yes
	No
[If "YES" to above] Please list the computer science certifications or endorsements you have:	[Open response]
Do you have experience working in the computer science industry as a professional?	Yes
	No

How much professional development on teaching computer science did you have before participating in the ECS professional development sessions?	None
	Some
	A Lot

General Education Background

Item	Response Options
What is the highest educational degree you have earned?	High school/GED
	Associate's Degree
	Bachelor's Degree
	Master's Degree
	Doctoral or Professional Degree (PhD, EdD, MD, JD, etc.)
[If "Associate's Degree" or higher is selected above] In what area is your primary undergraduate degree? Select only one.	Art Music, or Foreign Language
	Business
	Computer Science
	Education
	Engineering
	English/Language Arts
	Mathematics
	Science
	Social Sciences
	Other: (Write in)

Teacher Characteristics

Item	Response Options
What is your age?	[List out all options: 20 – 65+; Prefer not to answer]
What is your gender identity?	Male
	Female
	Other
	Prefer not to answer
Which of the following best represents your racial and/or ethnic identity? Select all that apply.	[List response options for your study]

† 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.

Technical Information about the Teacher Instrument

The BASICS team recognized that not everyone in the community would want/need to use the entire BASICS Teacher Questionnaire. Rather, we suspect it is more likely that researchers and evaluators will find value in certain components, or categories of the instrument. For example, an evaluator may need validated Teacher Questionnaire subscales to systematically measure implementation (e.g., *Teacher Facilitation of Cognitively Demanding Work*) but may not need any contextual factor subscales to measure potential supports and barriers to implementation (e.g., *Teacher Resourcefulness and Coping*), or vice versa.

Moreover, we view the questionnaire categories as completely distinct from one another (i.e., the implementation subscales are distinct from the contextual factor subscales) and not part of one larger, multi-dimensional construct. Thus, in the final round of psychometric analysis, our approach was to compute internal reliability for all subscale measures, and then a series of CFA for each primary category/component of the Teacher Questionnaire. This allowed us to look at each category/component separately and make decisions about items within the category subscales to retain or drop based only on the overall improvement of that "set" of category/component subscales. The categories are: a) **implementation** – teacher facilitation and b) **contextual factors** that can influence implementation/instruction with the curriculum.

Following each administration of the questionnaire to different populations, the team assessed model fit using a variety of goodness-of-fit indices: chi-square value (χ^2) and ratio to degrees of freedom ($\frac{\chi^2}{df}$); Root Mean Square Error of Approximation (RMSEA); Comparative Fit Index (CFI); and Tucker-Lewis Index (TLI). We used established recommendations for each fit index value, and considered a model to be a "good fit" if it yielded a non-significant chi-square value (noting that large samples often result in inflated values); $\frac{\chi^2}{df} \leq 3$; RMSEA < 0.06; and CFI and TLI $\geq$ 0.95 (Hu & Bentler, 1999, Brown, 2006). In other models, we used CFI and TLI ≥ 0.90 and RMSEA < 0.08 to indicate an acceptable fit.

Results:
In the final, third year of instrument refinement, confirmatory factor analysis of the **Teacher Questionnaire implementation - facilitation components** (i.e., teacher report of how the ECS materials are used in practice) and subsequent refinement of them yielded six statistical factors and an excellent overall statistical fit including TLI of 0.96, CFI of 0.97, and RMSEA of 0.05. The six statistical factors, or constructs, of the final teacher implementation model include: *Teacher Facilitation of Cognitively Demanding Work, Teacher Facilitation of Student Interest, Teacher Facilitation of Students Taking Intellectual and Emotional Risks, Teacher Facilitation of Student Autonomy, Teacher Facilitation of Small Group Participation, and Teacher Use of Assessment to Inform Instruction.*

CFA of the **Teacher Questionnaire "contextual factor" components** (i.e., subscales for measuring the supports and barriers that influence teacher use of the CS curriculum) of the first

model resulted in four factors. A second order model then yielded one latent construct and a good overall statistical fit (TLI of 0.96, CFI of 0.97, and RMSEA of 0.06). The single latent construct of the final teacher "contextual factor" model includes subscales: *Teacher Resourcefulness and Coping, Teacher Innovativeness, Teaching Ability Beliefs (General),* and *Teaching Ability Beliefs (CS*).

Further details coming soon