BootUp Professional Development

Evaluation of Teacher Professional Development

2023-24

Evaluation Conducted by

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1. Executive Summary

This study evaluates BootUp PD during the 2023-24 school year in 3 aspects: (a) teachers' confidence for teaching coding, (b) teachers' experience with coding, and (c) teachers' evaluation of their BootUp PD experience. These were evaluated by collecting data via a survey at the first and final PDs that teachers participated in throughout the year. Roughly 50% of teachers that completed the pre survey were represented on the post survey. Overall key findings are presented in this executive summary. This are divided by positive and negative key findings

1.1. Things to Celebrate

Teachers' Confidence for Coding

1. Teachers' confidence to teach coding grew by 74%
2. Nearly 95% of teachers reported improving their confidence to teach coding from before to after BootUp PD. Less than 1% of teachers reported a negative experience.
3. Teachers' beliefs about coding (value, computational thinking self-efficacy, coding self-efficacy, and teaching coding self-efficacy) all increased statistically significantly, with a large practical effect on their coding and teaching coding self-efficacy.

Teachers' Experience in teaching Coding

1. Most teachers who taught coding throughout the year reported doing so in longer lessons (30+ minutes)
2. Teachers overwhelmingly reported high student interest in coding, stating it as their greatest success.
3. Over 75% of teachers reported that BootUp increased students' interest in coding. Not a single teacher reported that students' interest in coding decreased due to their BootUp experience.
4. Only 7 teachers (~2%) suggested that students' were uninterested in their intent to persist with coding.

Teachers' BootUp PD Experience

1. Teachers overwhelmingly preferred in-person to online PD (70% vs 10%)
2. Teachers highly praised BootUp's hands-on approach in their workshops
3. Teachers would recommend BootUp PD to their peers as an 8.8 out of 10.
4. Teachers rated their satisfaction with BootUp PD as 4.5 out of 5.0

1.2. Things to Improve

Confidence to Teach Coding

1. Teachers only reached a 5 out of 6 on one belief about teaching coding (value), which started above a 5. This indicates that they can still grow in their confidence for their own ability to think computationally, to code, and to teach coding.
2. Despite strong practical and statistically significant gains, teachers' confidence for coding ended up half-way between "somewhat agree" and "agree," indicating continued opportunity for growth.

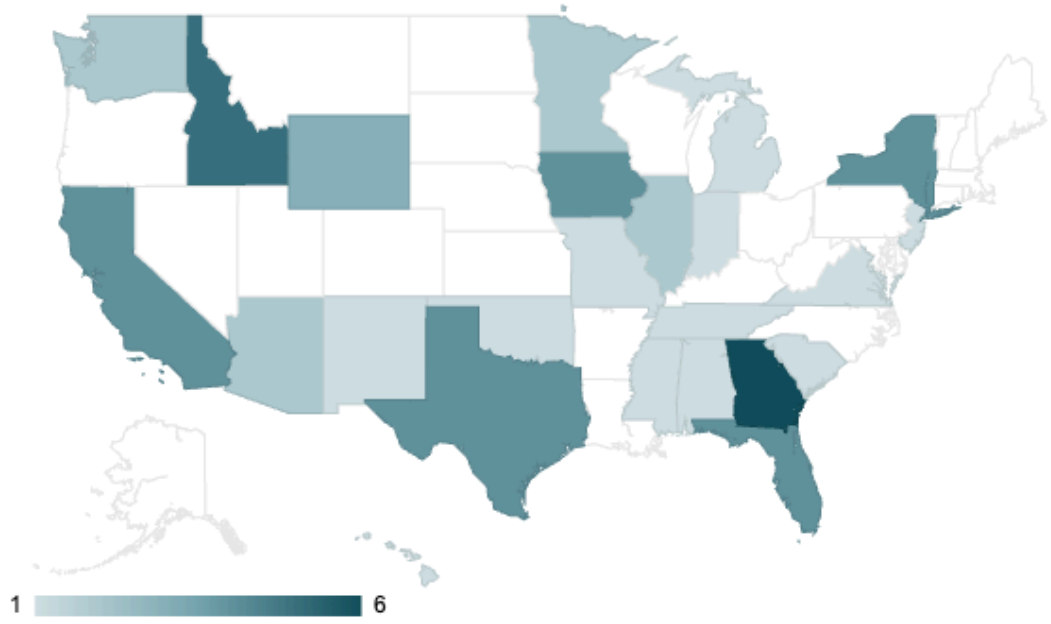
Experience in Teaching Coding

1. *Teacher ability* and *time* were cited most often as teachers' greatest challenge to implementing coding in their classrooms.
2. 52% of teachers indicated that there were minimal expectations to teach any coding beyond the workshops. A Chi-square analysis revealed that these teachers actually taught coding significantly less than those with more than minimal expectations. Establishing stronger expectations for implementation will likely result in teachers teaching coding more often.
3. About half of BootUp PD teachers reported teaching coding weekly or more often with half teaching it monthly or less often. This may be explained by items 1 & 2 on this list.
4. On average, teachers reported integrating coding with one language arts and one science lesson. This is a good start to integration, but indicates a lack of overall integration with all core subjects.
5. Teachers reported feeling middling support (about 6/10) from other teachers at their school, their principal, the district and students' families. If teachers do not feel supported in teaching a new subject, they are unlikely to persist in doing so.

BootUp PD Experience

1. While the survey response rate increased nearly 150% this year over last year, teacher attrition remains an issue. Only 50% of teachers responded to the final survey.
2. NOTE: It was difficult to identify anything negative that the majority of teachers reported with their BootUp PD. To identify possible areas for improvement in the BootUpPD experience, I looked at the NPS detractors' qualitative responses to how they felt about teaching coding before and after BootUp PD. I coded these responses as "improved," "same" or "not improved." Only a single teacher (.2%) had a "not improved" response.

2. Demographics



During the 2023-24 school year, BootUp trained teachers from 549 schools across 54 districts, representing 24 states. These trainings took place across a diversity of locales (see Table 1), with the highest number of schools serving students in large cities (40%), suburbs (24%), and midsize cities (16%). About 8% of schools served in 2024 were in rural or distant communities.

Table 1. *Breakdown of Schools by Locale*

Locale	Count	%
City:Large	220	45%
City:Midsize	68	14%
City:Small	19	4%
Rural:Distant	10	2%
Rural:Fringe	17	3%
Rural:Remote	1	0%
Suburb:Large	119	24%
Suburb:Midsize	17	3%
Town:Distant	9	2%
Town:Fringe	8	2%

Overall, schools that participated in BootUp PD in 2023-24 were responsible for teaching 1,584,024 students. Over 80% of these are students of color, and just over 48% are female. Two thirds (67%) of students at these schools qualify for free and reduced meals. Forty-six percent of participating schools have school-wide Title 1 status. Clearly, in 2023-24, BootUp successfully partnered with schools with traditionally under-represented populations in computer science.

3. Methods

Teachers completed a pre survey of their beliefs about teaching coding and computational thinking at the beginning of their first PD and at the end of their last PD. The survey consisted of questions from the Teachers' Beliefs about Coding and Computational Thinking (TBaCCT) scale (Rich et al., 2021), a validated scale for measuring teachers' self-efficacy for learning to code and to think computationally.

The initial survey took roughly 10 minutes to complete. Following their final PD, teachers completed another survey with the same questions. The final survey also included additional questions about teachers' practice in implementing what they learned from their BootUp PD experiences as well as their personal evaluation of the BootUp PD program.

Data analysis consisted of descriptive and inferential statistics. Descriptive statistics provide information about the amount of teacher participation, averages, standard deviations, and the general shape of the teachers' responses to the posed questions. Inferential statistics provide comparisons of means between individuals and sub-groups. Means were compared between the entire pre and post population as well as within just those for whom we were able to collect and identify both pre and post tests. Other tests (e.g., ANOVA, multiple regression) were run to compare groups and identify factors that may have had an effect on variable(s) of interest, such as teachers' years of experience teaching or teacher role on their TBaCCT scores. Throughout the Results section, we identify each test used as the results are presented.

4. Results

Overall, 864 teachers completed the pre survey, with 422 teachers completing the post survey. The pre-survey teachers represented 421 different institutions from 37 different districts. The post-survey teachers represented 219 schools from 28 different districts. The results presented forthwith represent those who completed the BootUp trainings and subsequent surveys.

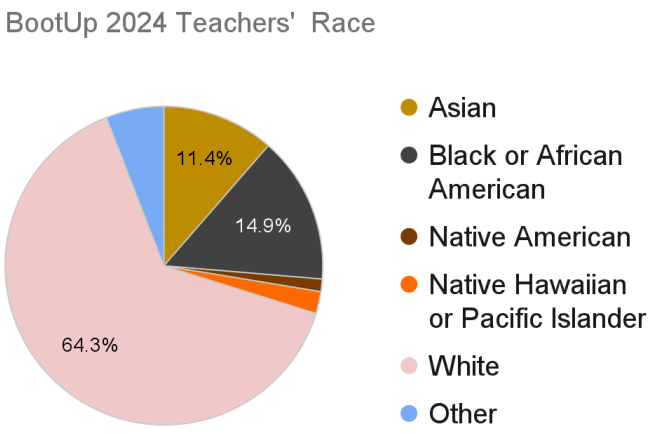
4.1. Completion Rate

The number of teachers who completed the post-survey was a concern in the 2023 report. Attrition happens for a variety of reasons, such as a district deciding to start but not finish PD, a teacher's personal circumstances preventing them from finishing, or teachers not showing up to the final training to complete the post survey. The 2024 completion rate was nearly 50%, up 15% from last year, reflecting teacher completion rates closer to those experienced in the 2021-22 and 2022-23 school years.

year	pre	post	response rate
2019-20	458	174	38%
2020-21	310	164	53%
2021-22	381	200	52%
2022-23	946	322	34%
2023-24	856	422	49%

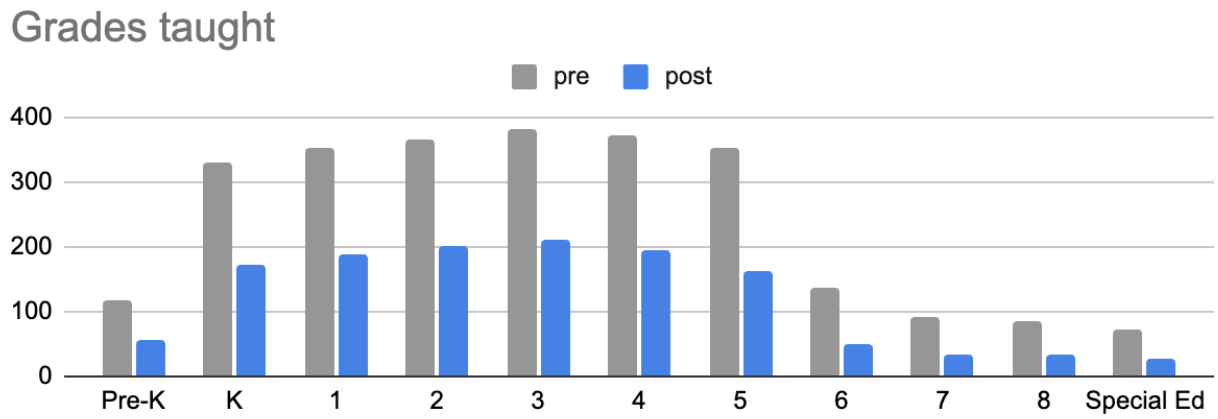
4.2. Teacher Characteristics

The majority (85%) of teachers who completed BootUp training were female, while 15% were male. Teachers who completed the BootUp training reported an average of 14.5 years teaching, with an average of 1-3 years teaching coding. Teachers are well educated, with ⅗ of teachers having earned a master's or a doctoral degree.



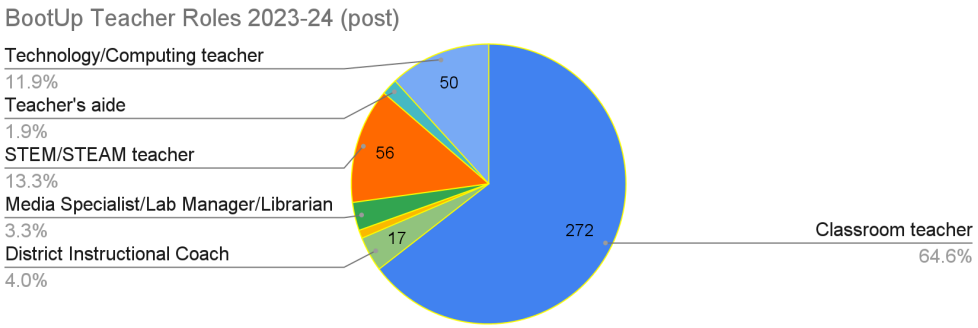
This year's teachers were largely willing participants, asking to participate in BootUp when they heard about it. However, 44% indicated that they were told they had to participate. It's possible that this number is higher when considering teachers who started but did not complete BootUp training in 2023-24.

While the vast majority of teachers who participated in BootUp in 2023-24 teach elementary grades (K-5), there were a handful who taught middle grades and special education.



4.3. Teacher Roles

Many different kinds of teachers participate in BootUp PD each year. These encompass classroom teachers, instructional coaches, English language learning specialists, media specialists/librarians, STEM/STEAM teachers, technology/computing teachers, and paraprofessionals or teachers' aides. Interestingly, the profile of teachers participating in BootUp has changed over the past five years. Nearly ⅔ of teachers who completed the post survey in 2024 were classroom teachers. The majority of other teachers were specialists of some sort. This is a change from 5 years ago when over 75% of teachers were specialists and classroom teachers made up 20% of BootUp participants.



4.4. The Effect of BootUp Training on Teachers

The primary effect of BootUp professional development is to positively impact teachers' confidence and competence to teach elementary coding in the classroom. To that end, this section analyzes several factors that report on changes in teachers' coding ability.

4.4.1. Before vs. After

We asked teachers to tell us how they felt about coding before and after learning to code. The vast majority (94.5%) of teachers indicated some type of overall improvement, 4.7% indicated that they started in a good place and felt the same, and less than one percent (.8%) indicated that they did not have a positive view of teaching coding and still had concerns about teaching it in the classroom.

There were generally 3 different categories of responses about how teachers felt before and after coding:

- Ignorant → Excited/Confident
- Hesitant/Anxious → Excited/Confident
- Confident/Excited → More Excited/Confident

The following table shows samples of teachers' comments in each of these categories, representing their feelings about teaching coding before and after participating in BootUp professional development.

Teachers' Feelings about Teaching Coding

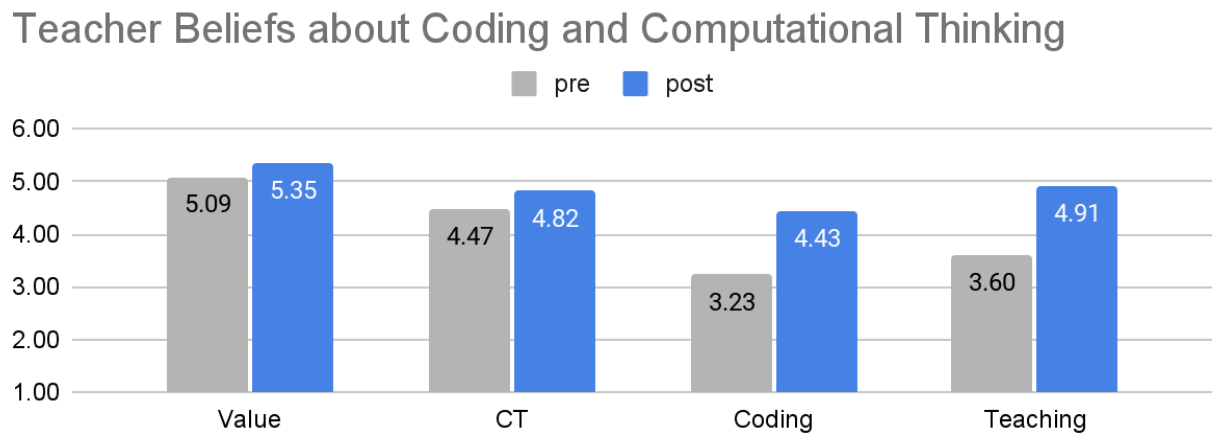
BEFORE BootUp PD	AFTER BootUp PD	Change
Coding was difficult and I would not be able to do it.	I feel very confident and want to explore more.	Hesitant/ Anxious → Excited/ Confident
I was scared and did not know what I was getting myself into.	I feel excited about the new skills I learned and ready to show the skills to my teachers.	
Fearful. I did not have any experience with coding.	Assured. I learned how to use the software with training.	
I was very unsure about my ability to complete a coding lesson.	Confident in my abilities to complete a lesson.	
It was something that I didn't feel confident about. I always thought it was very cool, but other than code.org I didn't have much	I still think it is cool! While I find it challenging, I see the benefits of having our young students know how to code.	

Teachers' Feelings about Teaching Coding

BEFORE BootUp PD	AFTER BootUp PD	Change
exposure to it.		
Apprehensive and frustration	Excitement and comfortable with not knowing the answers.	
I was a little hesitant but very curious.	I am very excited and would love to be the main computer science teacher at my school.	
obscure. I had no idea what it was.	more at ease. I definitely feel more comfortable.	Ignorant → Excited/ Confident
I was not sure how you taught coding with students, especially kindergarten	I now understand simple ways coding can be done.	
I had taught some coding lessons, but still felt not as knowledgeable as I would like to in order to support my students.	I feel pretty comfortable working through most projects with students and am usually able to find an answer for students if I don't know something right away.	
Had no idea what it entailed.	It is fun and exciting and doable for students.	
scary, I know nothing about this and definitely wasn't something I was going to understand	it doesn't have to be as difficult as I thought, it can be but it can also be simple and put into manageable sized chunks for young students	
I was clueless	Way more confident in teaching it	
Great. I have been doing it for a long time	Even better. I love finding additional resources	Confident/ Excited → More Confident/ Excited
I was comfortable teaching coding prior to BootUp.	After the BootUp trainings I feel more comfortable about teaching coding not only to students, but my colleagues too.	
The same. I love coding. However, the training gave me so many, many more ideas!	I have numerous ideas added to my lesson ideas and plans!!! I have amazing resources and things to refer to and I can share them easily with other employees as well.	
I loved coding! however, felt that there wasn't a program that allowed scaffolding for students to create multiple projects.	I'm able to provide scaffolding for students to build projects that they can fit better to their needs and interests.	
I was comfortable with the code.org format but was nervous about scratch jr.	I am much more comfortable with ScratchJr and my ability to teach this to my students	

4.4.2. Beliefs about Coding and CT

Teachers reported their beliefs about coding before and after training. They did this by replying to questions on 6-point Likert-scale, ranging from "strongly disagree" to "strongly agree." The beliefs measured encompass: (a) the value of teaching coding to children, (b) teachers' self-efficacy for computational thinking, (c) teacher's self-efficacy for coding, and (d) teachers' self-efficacy for teaching coding in the classroom. The goal is to help teachers "agree" with belief statements in each of these areas, which is a 5 out of 6 on this scale.

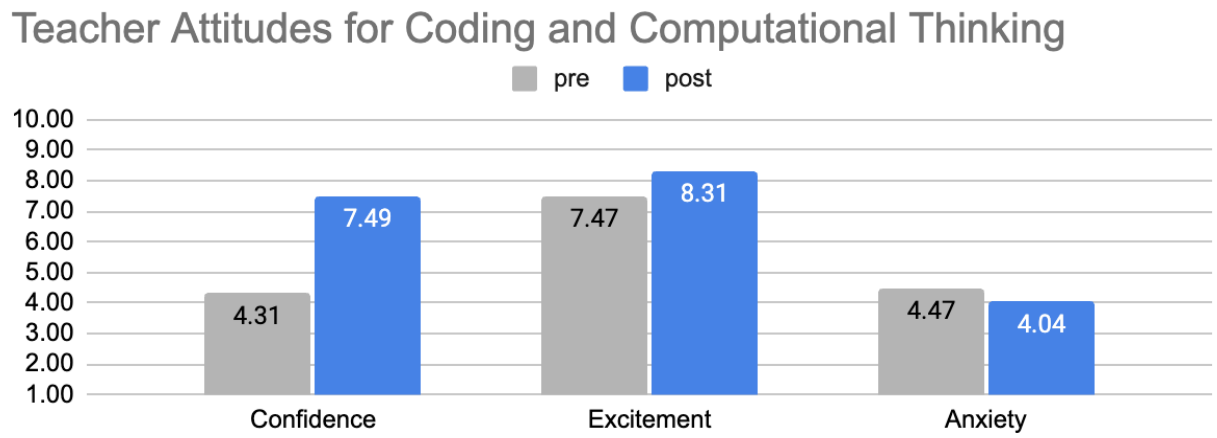


As noted in the chart above, teachers only started above a 5 in their *value* beliefs. This means that teachers started out agreeing that coding is important for elementary-aged children. In all other beliefs, teachers started lower, with their self-efficacy for coding being the lowest (closest to "somewhat disagree" about their confidence to code).

A comparison of means (t-test) showed that BootUp participants increased in statistically significant ways in each of their beliefs about coding ($p < .05$). Their growth in values and computational thinking showed a small practical effect (Hedge's $g = 0.369$ & 0.402, respectively), while their growth in coding and teaching resulted in a large effect size (Hedge's $g = 1.079$ & 1.122, respectively). While this growth is admirable, there is still room for improvement, as teachers did not report reaching a 5 in CT, coding, or teaching coding self-efficacy. Specifically, as teachers gain more coding confidence they are likely to gain confidence in the other areas. Coding confidence tends to increase with more time and exposure to coding as well as when teachers engage in more complex coding projects.

4.4.3. Teacher Attitudes for Coding and CT

Another indicator that can show teacher growth for teaching coding and computational thinking is their attitude. We asked teachers to report their confidence, excitement, and anxiety for teaching coding on the pre and again on the post survey. In all, 89% of teachers reported a positive change in their confidence from their pre survey rating, 4% reported lower confidence in the post, and 7% reported no change. As noted in the chart below, teachers started with a low level of confidence to teach coding, despite having 1-3 years' experience teaching coding prior to participating in BootUp professional development. Fortunately, they did start with high excitement and low anxiety, demonstrating that they were emotionally prepared to participate in training.



The result of participating in BootUp training throughout the 2023-24 school year was a 74% growth in confidence, 11% growth in excitement and 10% decrease in anxiety. All changes were statistically significant. This indicates successful training and hits the target of increasing teachers' positive attitudes for teaching coding.

4.4.3.1. What difference does Recruitment make?

To determine if there were a difference between teachers who were voluntold vs. those who volunteered, I use a Mann-Whitney U test to compare means of the groups on the pre, the post, and the difference between the two.

Mean Emotions score x Recruitment type (pre vs. post)

	volunteer-pre	volunteer-post	voluntold-pre	voluntold-post
Confidence	4.695	7.962	3.822	6.780
Excitement	8.070	8.799	6.844	7.634

Anxiety	4.185	3.669	4.490	4.135

Statistical analysis revealed a significant difference between teachers' confidence and excitement but not their anxiety. This was true for both pre and post scores. However, there was no difference in the degree to which teachers changed in their emotions. This suggests that **the BootUp training was just as effective for teachers whether they were voluntold or whether they volunteered to participate in the professional development.**

4.5. Practice

In this section, we review the ways in which BootUp teachers reported implementing their lessons and taught coding in the classroom throughout the year. This includes the frequency and duration of lessons, inspiration for their lessons, frequency of teaching integrated lessons, how they handled difficulties and challenges and how they believed their students received the teaching of coding.

4.5.1. Frequency

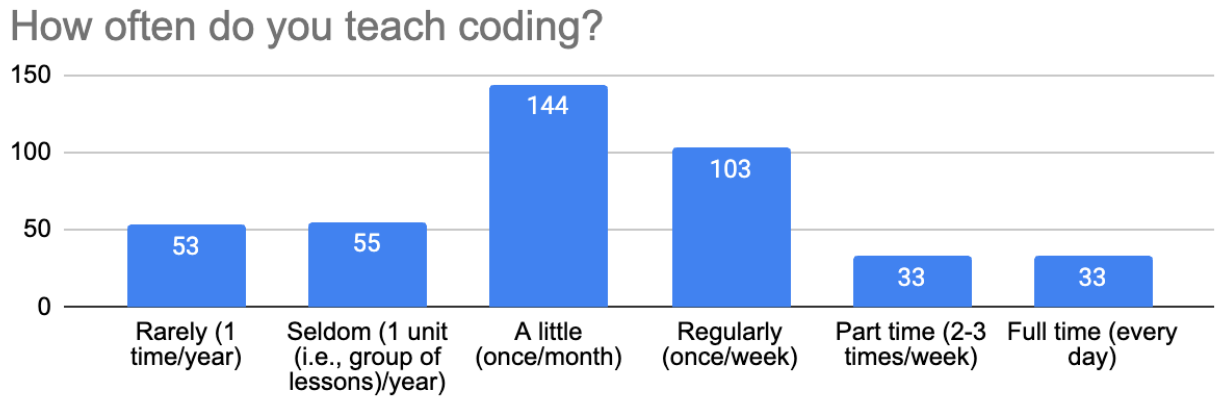
We asked teachers what expectations were for them to teach coding throughout the school year. As highlighted in the table below, the most common response was that there were no expectations, meaning that while teachers participated in the PD, they would not be held accountable for needing to implement these practices. Only 10% of teachers indicated that they were expected to teach coding weekly, and 17% indicated that they were expected to teach at least monthly. These expectations are important to consider when looking at how often teachers actually taught coding.

Expectations that Teachers would Teach Coding in 2023-24

There were no expectations	146
I would teach 1-2 coding lessons over the course of the year	47
I would teach coding at least once a month	56
I would teach coding at least once a week	39
I would integrate coding into my existing lessons	62
I would teach coding daily	25

About 60% of teachers reported teaching coding once a month or less often, with monthly being the most common frequency for teaching coding. For those teaching

coding more frequently, weekly was the most common response. While the increase in teaching coding is encouraging and exceeds the expectations placed on these teachers (as reported by the teachers themselves), **teachers are not likely to grow in their capacity and confidence for coding until they begin teaching it more regularly.** One target for future improvement would be to encourage weekly coding activities. This is a change that is outside the scope and power of BootUp to ensure. Thus, BootUp will need to work with school administrators to ensure that there are clear expectations for implementing what teachers learn during PD.



4.5.1.1. Expectations x Frequency

One might hypothesize that teachers with clear expectations to teach coding more frequently would actually teach coding more often. To test this assumption, I grouped teachers into two 'expectation' groups: (a) "minimal" and (b) "some," defined below:

- *minimal*: teachers who reported expectations to teach one or two lessons or less.
- *some*: teachers expected to teach coding monthly or more often.

A crosstabulation of frequency by these two expectation categories reveals the following counts of how often this occurred. Note that this reports only teachers for whom we have both pre and post data and who answered these questions.

Frequency of teaching coding x Expectation of teaching coding

	minimal	**some**
Rarely (1 time/year)	23	9
Seldom (1 unit)	35	4
A little (once/month)	55	48
Regularly (once/week)	35	47

Part time (2-3 times/week)	9	17
Full time (every day)	5	25

Visual inspection suggests there might be a difference between these distributions. To determine if there were a statistically significant difference between expectation groups on how often they taught coding, I conducted a Chi-Square test of Independence, which is used to determine if there is a significant association between two categorical variables. The test resulted in the following statistics:

- $X^2 = 48.40$
- degrees of freedom = 5
- p-value < .001*
- Cramer's V (effect size) = 0.394

This result indicates that there is a statistically significant difference with a medium to large effect. In layman's terms, **teachers with clear expectations to teach coding more often did so more often than those with minimal expectations**.

4.5.1.2. Recruitment x Frequency of Teaching

We also asked teachers how they were recruited to participate in BootUp, which yielded the following distribution. We were curious to determine if there was a relationship between the frequency of teaching coding and volunteering to or seeking out participation in BootUp versus those who were directed that they must do so.

Frequency of teaching coding x method of recruitment

	volunteer	**voluntold**
Rarely (1 time/year)	13	19
Seldom (1 unit)	25	13
A little (once/month)	75	28
Regularly (once/week)	52	30
Part time (2-3 times/week)	15	11
Full time (every day)	26	4

Similar to the expectation analysis, we grouped teachers into two recruitment categories: voluntold vs. volunteer. Using the data for those who finished both the pre and post surveys, we ran a Chi-square test of Independence. This returned the following results:

- $X^2 = 18.12$
- degrees of freedom = 5
- p-value = 0.0028*
- Cramer's V (effect size) = 0.241

This suggests that there was a moderately strong, statistically significant difference between how teachers were recruited to participate in BootUp and how often they ended up teaching coding throughout the year. **In short, teachers who volunteer to participate in BootUp PD are more likely to implement it more frequently in their classes.**

4.5.2. Teaching the Lessons

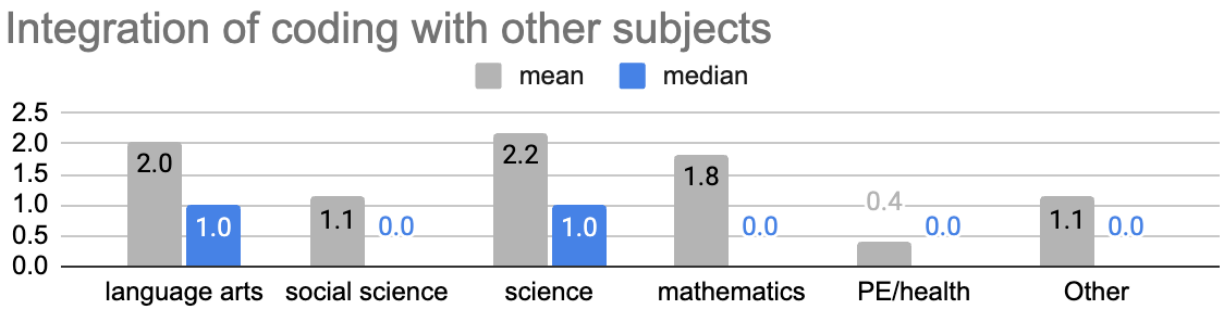
When teachers taught coding, they most often did so in longer lessons (i.e., >30 minutes). This is encouraging, as longer lessons enable students enough time to dig in and troubleshoot as they code. It's important to note that teachers of younger students will undoubtedly be teaching shorter lessons.

On average, how long are your coding/CT lessons?	
< 15 min	4
16-30 min	118
31-45 min	164
45+ min	82

The overwhelming majority (92%) of teachers reported that the lessons they taught were either modified slightly or not at all from the BootUp lessons. Thus, the lesson resources are an important tool for helping BootUp teachers to begin teaching coding in their classrooms.

4.5.3. Integration

The majority of BootUp teachers are classroom teachers and therefore generalists who must teach multiple subjects. Consequently, it is important that BootUp teachers learn how to integrate coding with their regular teaching. The following chart highlights that teachers integrated coding with several different subjects. Science and language arts were the most common subjects to integrate with coding, with the median teacher teaching at least one lesson in each of these areas during the 2023-24 school year.



4.5.4. Successes and Challenges

We asked teachers to identify their successes and challenges that they experienced when teaching coding. Teachers provided open-ended responses to these questions. We categorized their responses into different themes. We report the most common successes and challenges below, followed by a few representative quotes from teachers about the most prevalent successes and challenges they experienced. Curiously, two of the three top successes were also two of the three top challenges for teachers.

4.5.4.1. Successes

Successes	count
student interest	164
student ability	67
teacher ability	42
student collaboration	31
teacher implementation	27
problem solving	24
physical computing	20
integration	12
none	12
resilience	12
creativity	9
student creativity	8
teacher interest	8
debugging	5
student participation	3
student success	3
robots	2
parent interest	1

support	1

Teachers' *greatest success* was far and away the enthusiasm that they witnessed from their students surrounding coding. Statements classified as "student interest" referred to student excitement or enjoyment as they engaged with coding. This is exemplified by a few representative quotes below:

"After teaching coding to a new student, he got so excited and inspired, that he started working on projects at home and even became friends with probably the best coder in his grade and now they are making complex projects together."

"Students have become much more engaged in the science and math lessons I have taught. Students were tasked with creating a science comic with a science joke and it was great!"

"We have fostered a love for computer science. My students are excited to add their own personal flair to their learning. Using Scratch has been a fun tool for 'different' learners (one of our previous assessments was a five-paragraph essay, now it's a fun CS Scratch project)."

The *second-most common* success teachers mentioned noted an increase in students' ability levels. For example,

"Students absolutely loved the lessons and took off. After a period of time I had several students who had far surpassed me in skill and would help out other students during our coding time"

"Students (K-5) are using the language and principles of coding and computer science in their work. They breakdown problems, create sequenced instructions, find patterns, employ debugging strategies and conditionals."

"The "ah-ha" moments when the students struggle through a challenge and solve the issue."

The *third most-common* success that teachers mentioned was an increase in their own ability.

"I've built my confidence in teaching coding. I've been able to teach students to use Scratch, MakeCode (micro:bits) and to program Ozobots. The students were successful so

I feel successful. The students are very comfortable with coding and were not hesitant at all. They jumped right into it and started coding right away. They love it."

"I have learned to use Scratch through this Boot Up PD. I have also learned about many unplugged lessons that will help my students to learn about coding. One thing that I was successful with and enjoyed teaching was microbits. This boot up class also provided me with many resources that I can use to continue learning about coding/ct and teaching coding to my students"

"After this PD class, I have experienced many successes in teaching coding and Computer Science this year. One of the greatest successes has been in how comfortable I feel using Scratch, Jr. as a CS teaching tool. Prior to this year, I did not use Scratch, Jr. at all. After completing this PD class, I did 5+ lessons for 400 students in Grades K-2 using Scratch, Jr. Students were able to learn how to make one sprite move, use a loop block, add multiple sprites, and change backgrounds. They also learned how to personalize the look of their sprite using the edit panel. The experience has been extremely positive, with so many students commenting that "they love Scratch, Jr." or that "Computer Science is their favorite!" This is very rewarding and drives me to learn more about how to make my lessons fun and engaging."

4.5.4.2. Challenges

Teachers' challenges in teaching coding were more varied than their successes. Their own ability to code was their greatest challenge, demonstrating that although many teachers increased in their ability to teach code, many felt that it was their own inability to do so well that was holding them back, as evidenced by the following statements.

"The challenges I have faced in teaching coding/CT was that the learning curve was really high when taking this class. When learning Scratch, I felt like we already had to know how to code. I had no basic understanding of coding. I also do not have a regular classroom of students so it is very hard to consistently teach coding to my students regularly"

"I am not that knowledgeable and wish someone else could lead the class to do the lessons."

"I don't catch on as fast as younger ones."

The *second-most common challenge* teachers faced in teaching coding in the classroom was finding the time to do so.

"Time. I'm a novice and sometimes read through the steps too quickly. If I haven't tried the activity myself, I often lead students awry.... But they are good sports about it."

"This was new curriculum and for me I am working to find the right balance and timing of my lessons and projects."

"Not enough time. Not enough guidance from the district for how often to implement lessons."

The *third* most common challenge for teachers was student ability. Sometimes they faced issues with students struggling to understand coding, and other times they struggled with the variance in student ability to code, not knowing how to attend to students at different levels.

"The low literacy rate in my school can make coding difficult. I also spend a lot of time helping English learners one-on-one. I try to use color and positional cues to help students learn, but at the end of the day it's just tough to code if you don't read well."

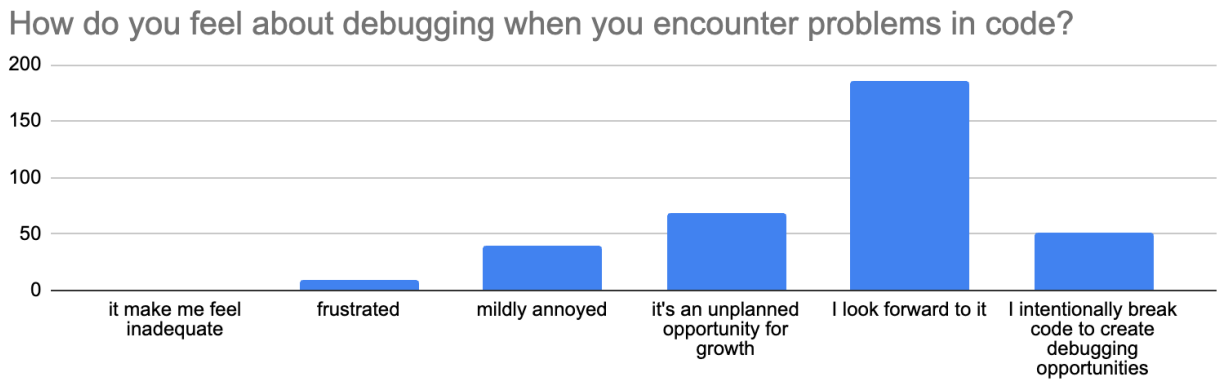
"The kids are better and faster than me."

Challenges	count
teacher ability	94
time	85
student ability	45
resources	40
student interest	15
none	13
debugging	12
integration	12
lesson planning	11
support	11
resilience	8
supporting all students	8
engagement	6
physical computing	5
classroom management	4
teacher buy-in	4
switching students often	3
assessment	2
misbehavior	2
student collaboration	2
student focus	2
attendance	1
everything	1
guilt	1
program features	1
program limitations	1
teacher interest	1
teaching all students	1

"Teaching students who are at different levels. I try teaching at grade level and helping those who are new to coding or are struggling while others move on."

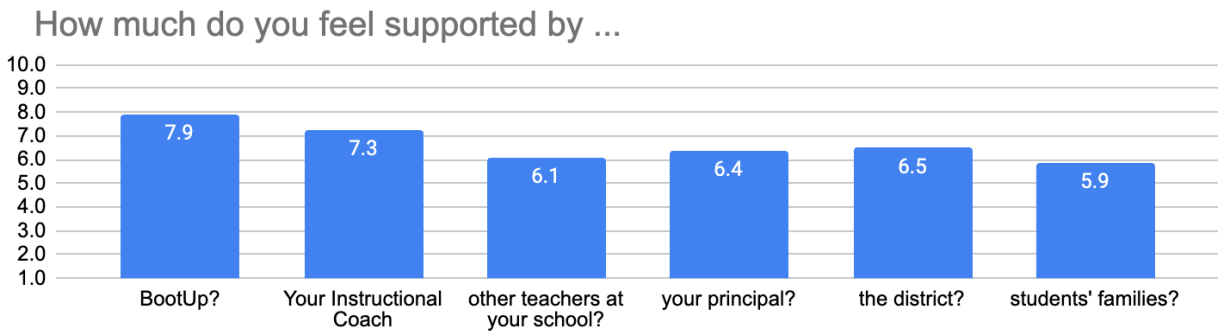
4.5.4.3. Dealing with Debugging

A common challenge when learning to code is the need to debug. Even the best coders will need to debug their code from time to time (or nearly every time they code!). As such, it's important that teachers learn to deal with debugging in positive ways. We asked teachers how they felt about debugging when they encountered challenging problems. As noted in the following chart, teachers demonstrated an overwhelmingly positive attitude toward debugging, with most suggesting that they look forward to it or even intentionally introduce bugs into their code.



4.5.5. Feelings of support

While teachers may be alone in their classrooms, there is a community of support around them that can facilitate or hinder their ability to do so successfully. This includes BootUp personnel, but also considers teachers' colleagues, administrators, and even students' parents. On a 1-10 scale, anything above a 7 would be considered a good level of support, with 8-10 being the ideal range for strong feelings of support.. Scores in the 6-7 range indicate that the teachers feel supported, but that there are some concerns to address. Anything below a 6 should be cause for concern and investigated to see what could be done. In 2023-24, teachers reported feeling good support from BootUp and their instructional coaches. They felt middling support from other teachers, their principal and the district. Curiously, teachers reported feeling a low-level of support from students' families. Inasmuch as family support can significantly impact student participation and success, this may be something to investigate.



5. Teachers' Evaluation of their BootUp Experience

An important indicator of BootUp's success is the degree to which teachers rate their experience with BootUp highly. This section seeks to demonstrate how teachers evaluated their BootUp professional development experience in 2023-24.

5.1. Ratings

Teachers were asked what their satisfaction with the BootUp program was on a 5-point scale. The average rating was 4.5/5, demonstrating high satisfaction with BootUp. To further understand teacher satisfaction further, we calculated a NET Promoter Score (NPS). Based on their responses, customers are categorized into three groups:

- **Promoters (score 9-10)**: These are loyal enthusiasts who will actively promote your product or service to others.
- **Passives (score 7-8)**: These customers are satisfied but not enthusiastic enough to promote your product actively.
- **Detractors (score 0-6**): These customers are unhappy and may spread negative feedback about your product or service.

The Net Promoter Score itself is calculated by subtracting the percentage of detractors from the percentage of promoters. It ranges from -100 (if all respondents are detractors) to +100 (if all respondents are promoters). NPS scores greater than 30 are considered good, while scores above 50 are considered excellent, indicating very high customer satisfaction. From the 422 teachers that responded to the question, 241 were promoters, 86 were passives and 42 were detractors. This resulted in an **NPS of 55.7%**, demonstrating high satisfaction and nearing the "excellent" category according to . Overall, teachers' response to the degree to which they would recommend BootUp PD to their colleagues was an 8.8/10.

5.1.1. Curriculum

To get an idea of the value of different aspects of the BootUp curriculum, we also asked teachers to rate specific components on a 1-10 scale. Specifically, we asked teachers to rate the following components:

- **Coder Resource**: Pre-built resources that can be used by learners to complete a BootUp project.
- **Hands-on Learning**: The applied nature of BootUp pedagogy
- **Model Teaching**: A BootUp facilitator visits the teacher's classroom and shows them how to carry out the lesson.
- **Paired programming**: When two teachers work on the same project, with one piloting the computer and the other navigating the code.
- **Sharing Projects/Ideas**: A co-creative approach to learning where teachers share their work and ideas with each other on how to teach elementary coding.
- **Lesson plans**: Pre-designed lesson plans that can be used to guide a class through a project.

Teachers rated all components in the 8-9 range, which shows high satisfaction overall. Model teaching and hands-on learning were rated the highest, while paired programming was rated the lowest. Despite the lower rating, it's important to note that these are all above 8 on a 10-point scale, indicating overall high satisfaction with each of these components of the BootUp experience.

BOOTUP COMPONENT	Rating
Model Teaching	8.9
Hands-on Learning	8.9
Coder Resource	8.7
Sharing Projects/Ideas	8.6
Lesson Plans	8.5
Paired Programming	8.3

5.2. Online vs In-Person

On average, teachers each attended about 6 BootUp workshops during 2023-24. There were two types of workshops: in-person or online. Teachers reported attending 3.6 in-person workshops and 2.3 online workshops. When asked which modality they liked better, **teachers overwhelmingly preferred the in-person workshops to online PD (69% vs 11%)**. About 20% reported that they liked them the same. When asked what their rationale was for choosing in-person over online training, teachers most often indicated that they felt they could get better in-person support. The second most-common rationale was that in-person PD was hands-on, which played to several

teachers' learning preferences. Finally, several teachers mentioned that they enjoyed collaborating with their peers in the in-person trainings. These feelings are exemplified by some of the following teacher quotes.

In-Person Support/Feedback

"It was easier to get quick and specific feedback in person."
"better help"
"Feedback and interaction with others is important--Group work"
"With the in-person, I could collaborate with peers and get help from the instructor."
"I need to be able to get hands on help. I feel more comfortable speaking face to face."
"I learn better by doing and immediate feedback by correction is great!"
"Easier to ask questions and get hands-on help"
"More free to ask questions and get help"
"If i need to ask questions the facilitator is there."
"easier to concentrate and I can ask questions and get feedback faster"

Hands-on

"I chose in-person because I liked the interactions, support and the hands-on activities."
"I like to see how things work firsthand."
"It allows us more hands on time and opportunities to get help."
"Hands-on, more focus, engaging, collaborating with colleagues of the same age group."
"The component is easier to understand the functionality and having an enjoyable hands on experience."
"I like to do hands-on training so that I can actually take part into during the activity than watching it or listening to it."
"It was easier to learn for me and I could get hands on experience and ask the facilitator questions."
"it is hands on and I can ask for help "
"Got to be more hands-on with the physical computing"
"Able to do hands-on and interact with others in the same physical space"

Online

Teachers who preferred the online format primarily cited convenience as their main rationale for their answer.

"More convenient
"It saves travel time, and gas money. I felt I could learn as much online."
"Preferred way to be taught on own time and convenient"
"It's easier for my schedule."

"Convenience; more gets done in less amount of time"
"It could be done from anywhere and there is no worry on transportation."
"Being able to work in the comforts of your own home."
"Easier to stay in the building than travel"
"The access to have an easy access to a charger and to have a more focused audio to follow on the computer (sometimes on the computer, the amount of teachers with the volume up can be distracting)"
"I like being in the comfort of my own area in my school and being able to investigate the tools."
"With longer PDs like these, I prefer to be in the comfort of my home."
"I don't have to drive anywhere."
"Nice to be in the comfort of my own home."
"I like the flexibility with schedules"
"Because it is difficult for me to get to the location in person"
"Flexibility for my schedule and family."
"Easily accessible"

6. Conclusion

Overall, BootUp PD trained nearly 900 teachers in 2023-24. Roughly half of those completed the PDs. Just over 99% of teachers reported positive gains or remaining the same in their confidence to teach coding, which confidence grew 75%. Teachers loved the hands-on approach to BootUp PD. They relied heavily on BootUp's teacher resources to teach coding their own classrooms, integrating most often with science and language arts. Teachers framed their greatest success as students' excitement for and interest in coding. Over ¾ of teachers felt that participation in BootUp increased students' interest in computer science.

Despite the successes, there are several areas for potential improvement. These include: (a) establishing clear expectations for classroom implementation, (b) strengthening the support teachers feel for teaching coding, (c) decreasing attrition during the workshops, and (d) figuring out a way to help teachers feel the same level of connection during online training as they do in-person.

One final recommendation is that BootUp establish clear criteria at the beginning of 2024-25 for what would constitute success this coming year. Doing so will enable BootUp personnel and teachers work together to accomplish similar goals and more effectively prepare more teachers to teaching coding in the classroom.