



About the 2018 NSSME+

- The 2018 NSSME+ is the sixth in a series of surveys dating back to 1977.
- It is the only survey specific to STEM education that provides nationally representative results.
- Reports are available at: horizon-research.com/NSSME/2018-nssme







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NGSS and the NSSME









Who's In the Sample

- 1,273 schools participated
- ~7,600 K-12 teachers
- ~900 elementary teachers of science







Terms

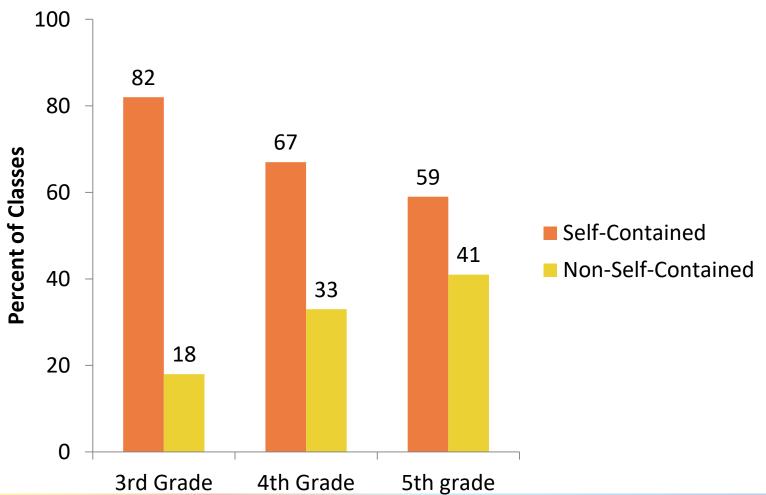
- Self-contained classroom: a classroom in which <u>one teacher</u> teaches <u>all core</u> <u>subjects</u> to <u>one group of students</u>
- Elementary teacher: someone who teaches in grades K-5, plus those who teach in selfcontained 6th grade classrooms.
- Primary grades: K-2
- Intermediate grades: 3-5, plus 6th grade selfcontained







Science Class Structure: Grades 3-5









Organization of This Talk

- Snapshot of elementary teaching force
- Science instruction in elementary classrooms
- Factors that shape instruction
 - Teacher background and beliefs
 - Teacher professional learning
 - Instructional resources
 - School and policy context







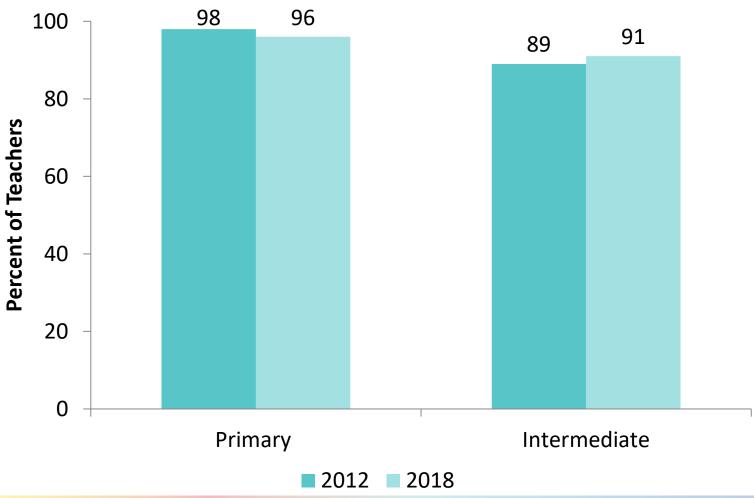
Elementary Teachers







Female Teachers

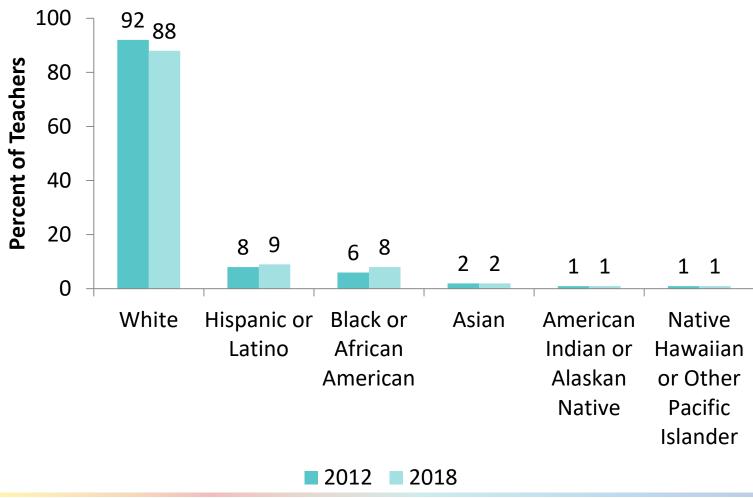








Race/Ethnicity





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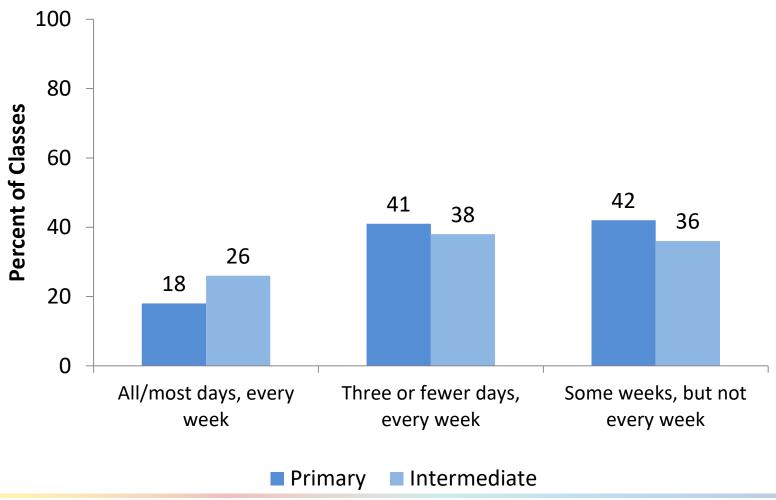
Amount of Science Instruction







Frequency of Science Instruction: Self-Contained Classrooms*

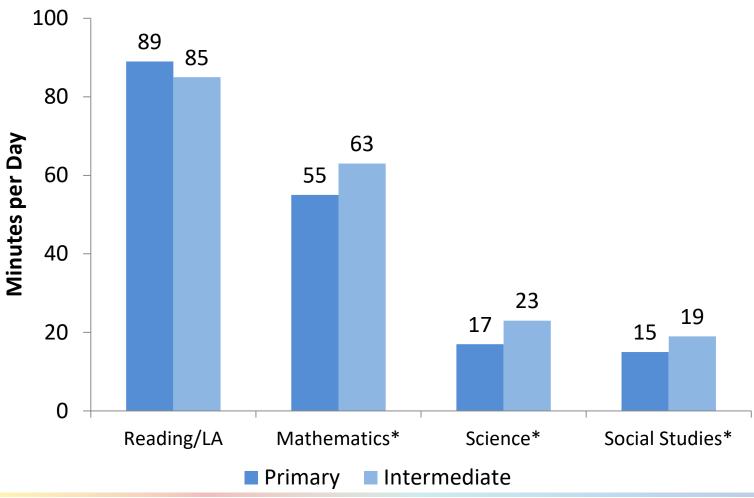








Instructional Time: Self-Contained Classrooms

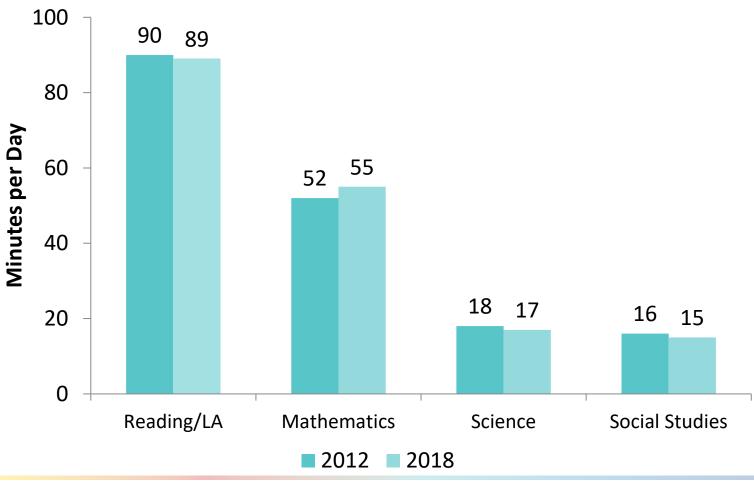








Instructional Time: Self-Contained Classrooms (Primary)

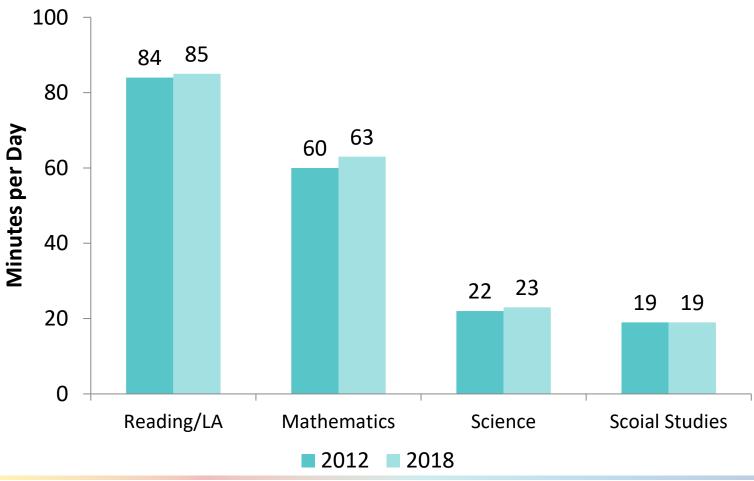








Instructional Time: Self-Contained Classrooms (Intermediate)

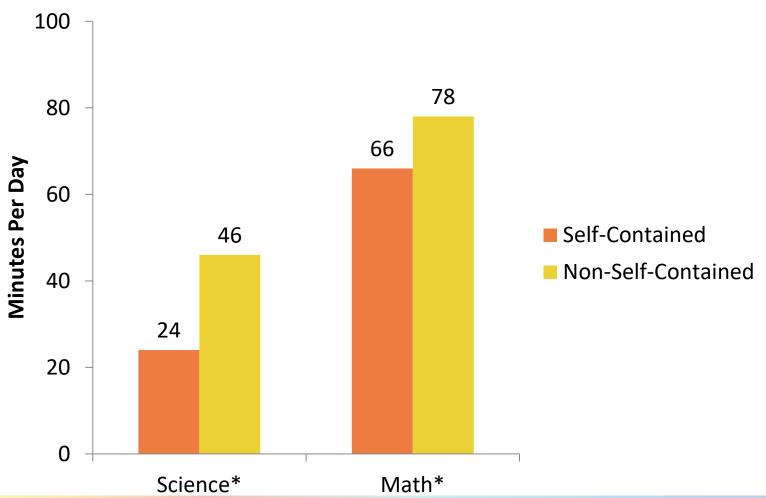








Science and Math Instructional Time: Grades 3-5









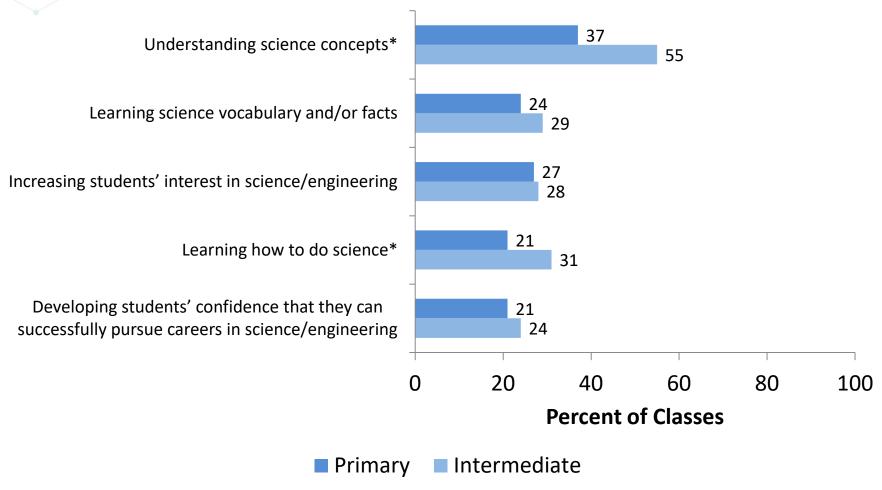
Instructional Objectives







Objectives Receiving a Heavy Emphasis

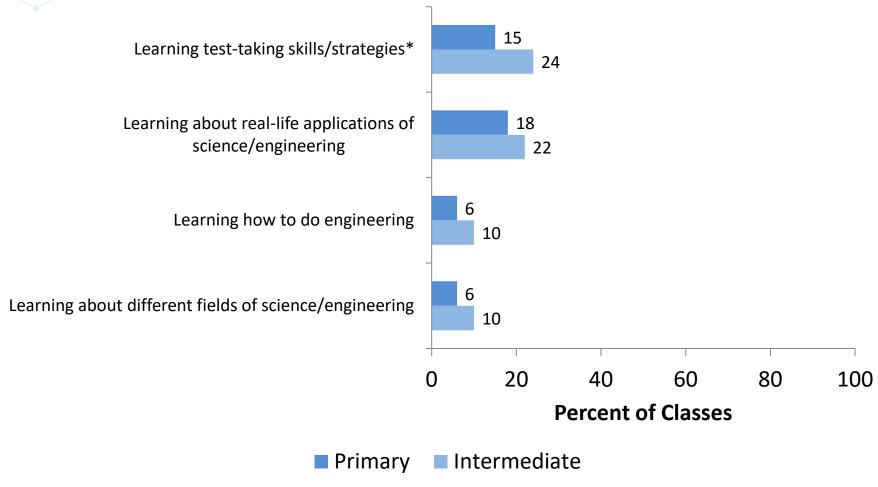








Objectives Receiving a Heavy Emphasis

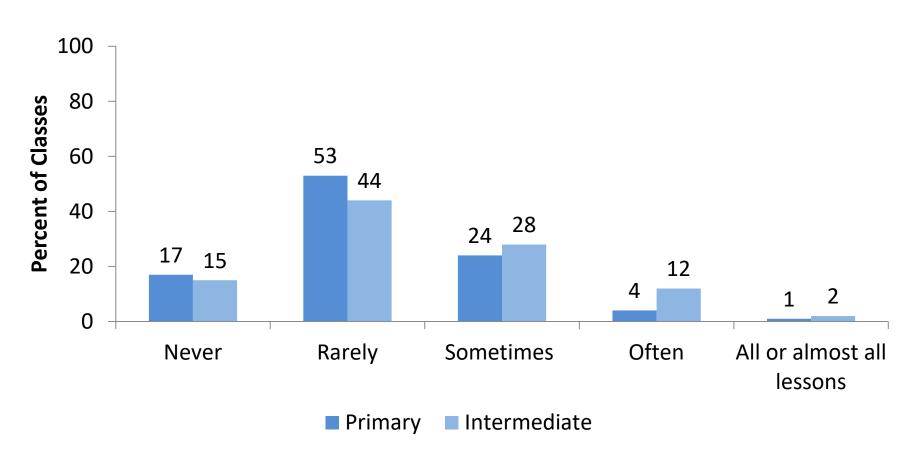








Incorporating Engineering Into Science Instruction

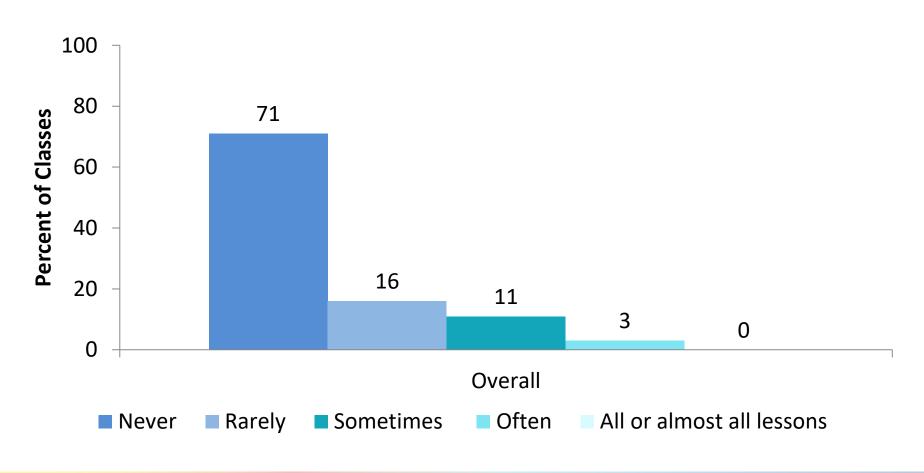








Incorporating Coding Into Science Instruction









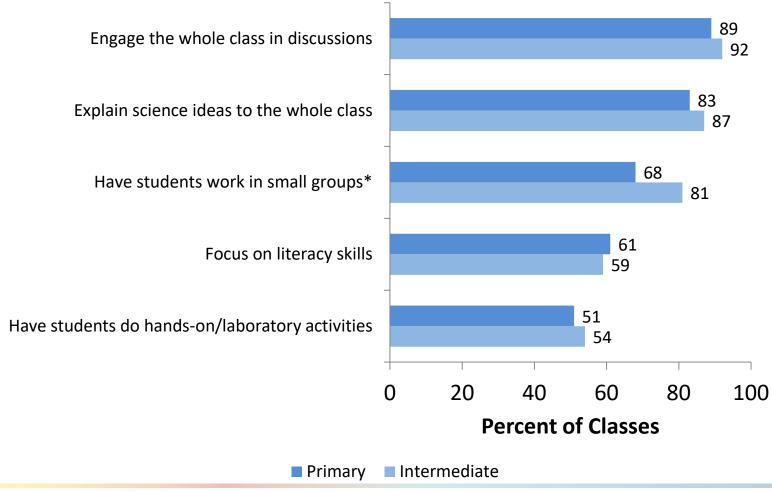
Class Activities







Class Activities: At Least Once a Week

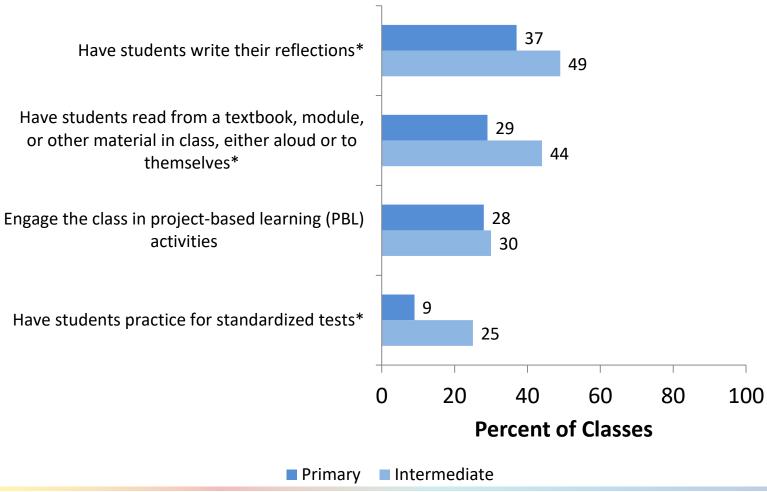








Class Activities: At Least Once a Week









Engagement in Science Practices

Elementary students are most often engaged in aspects of science related to conducting investigations and analyzing data

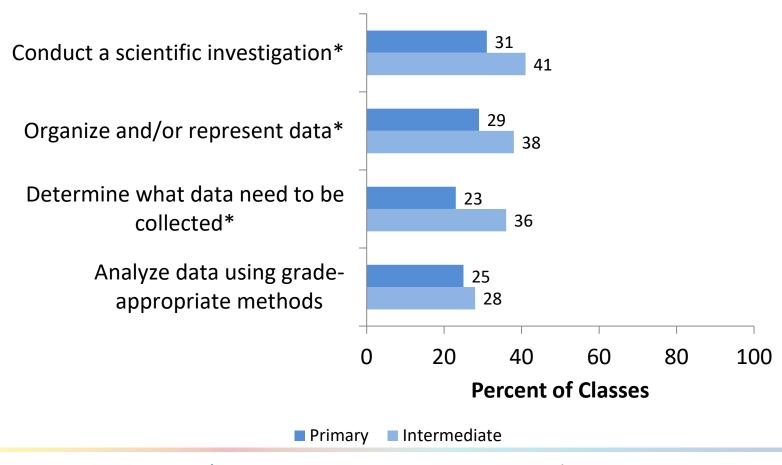






Conducting Investigations and Analyzing Data

Weekly





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Engagement in Science Practices

Students tend to not be engaged very often in aspects of science related to evaluating the strengths/limitations of evidence and the practice of argumentation.

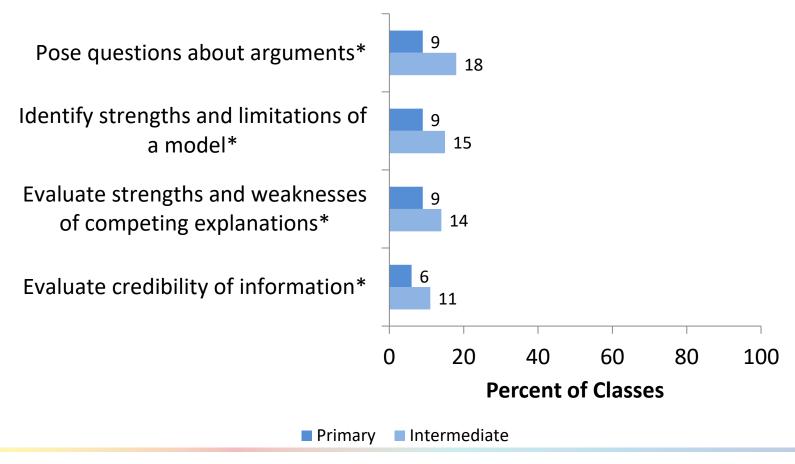






Evaluating Evidence and Arguing

Weekly

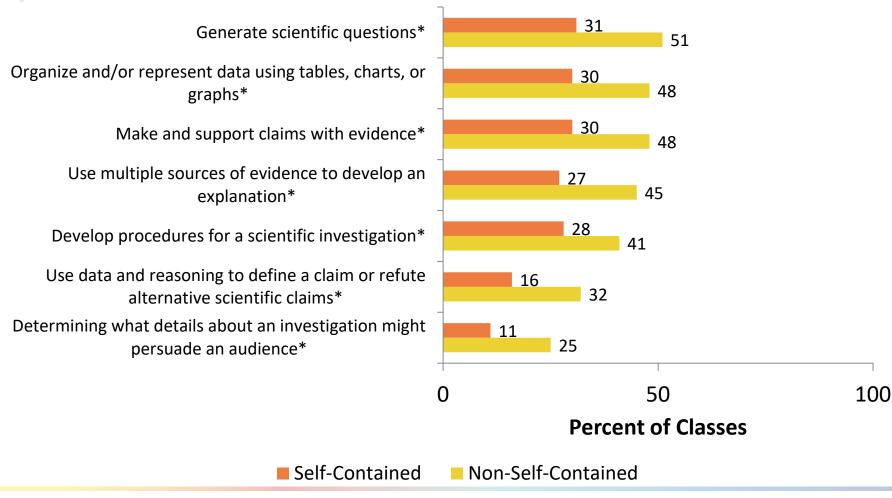




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Classes Engaging in Science Practices at Least Once a Week: Grades 3-5





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Takeaways

Elementary science instruction:

- Happens infrequently relative to reading/ language arts and mathematics
- Emphasizes concepts over practices
- Relies primarily on lecture, discussion, and small group work







Teachers Beliefs







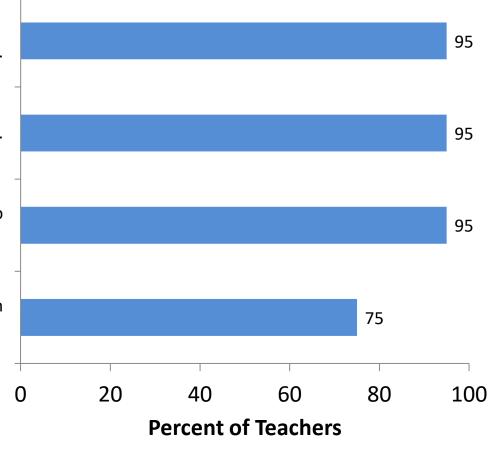
Teachers Agreeing With <u>Reform-Oriented</u> Beliefs

Teachers should ask students to support their conclusions about a science concept with evidence.

Students should learn science by doing science.

Students learn best when instruction is connected to their everyday lives.

It is better for science instruction to focus on ideas in depth, even if that means covering fewer topics.









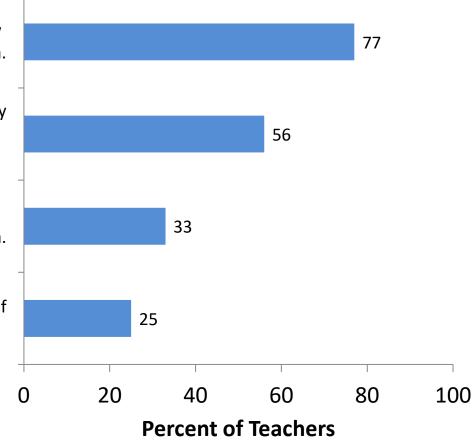
Teachers Agreeing With <u>Traditional</u> Beliefs

Students should be provided definitions for new vocabulary at beginning of instruction on an idea.

Hands-on/laboratory activities should be used primarily to reinforce a science idea that the students have already learned.

Teachers should explain an idea to students before having them consider evidence that relates to the idea.

Students learn science best in classes with students of similar abilities.









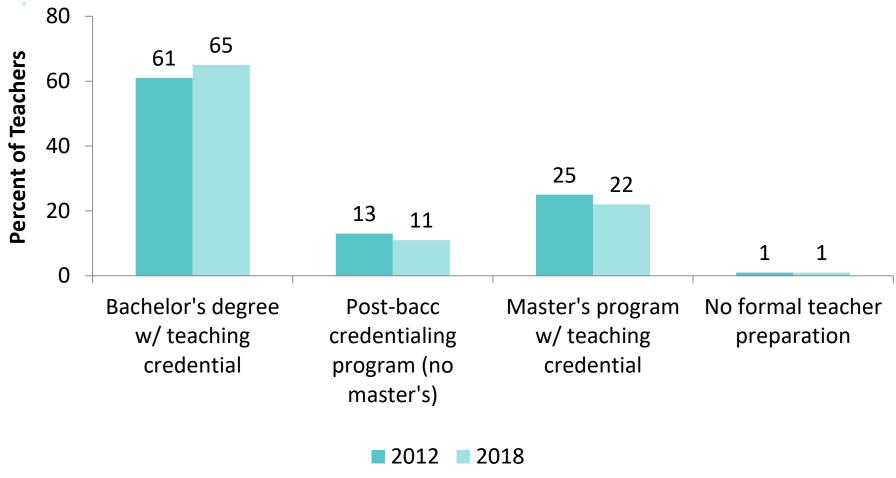
Teacher Preparation







Science Teachers' Path to Certification

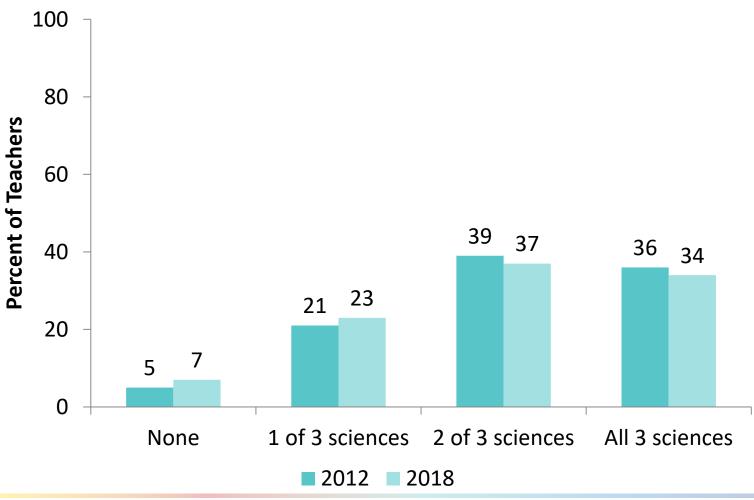








College Coursework Related to NSTA Standards









Perceptions of Preparedness

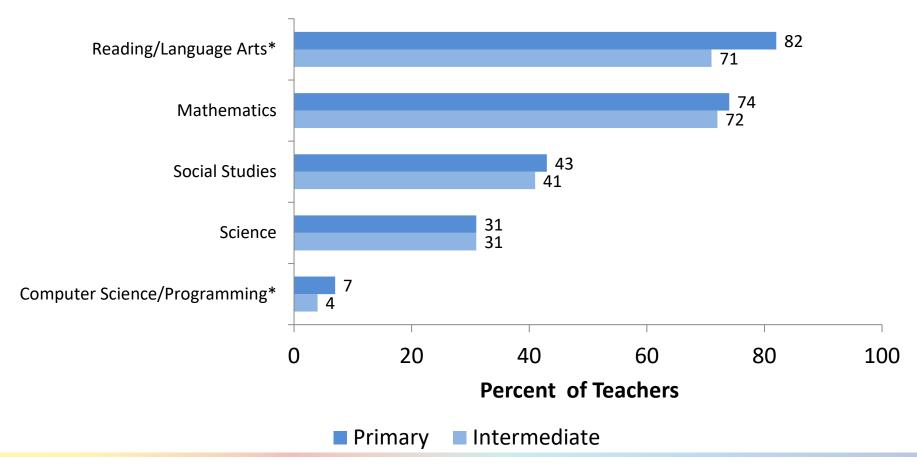






Perceptions of Content Preparedness

Very Well Prepared

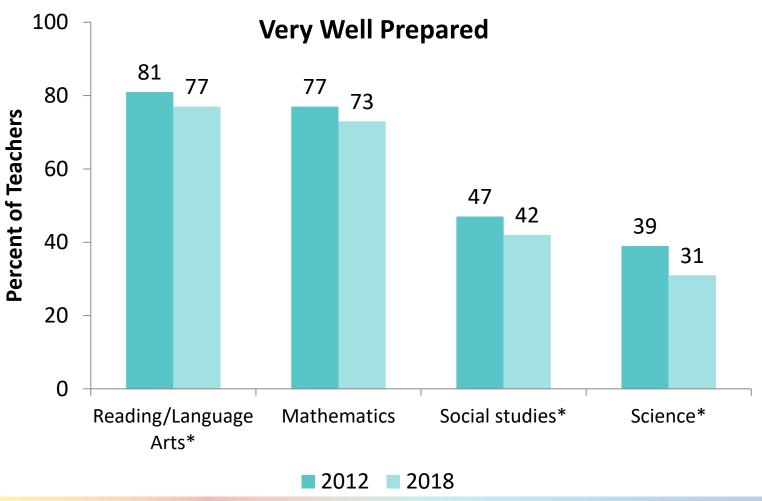




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Perceptions of Content Preparedness

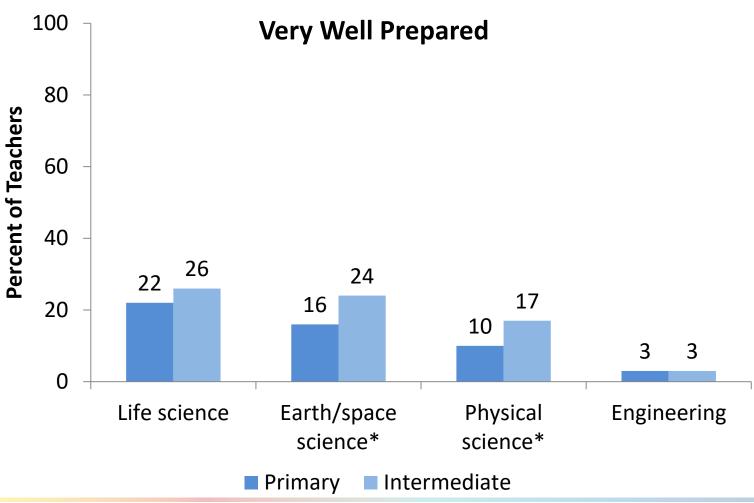








Perceptions of Content Preparedness

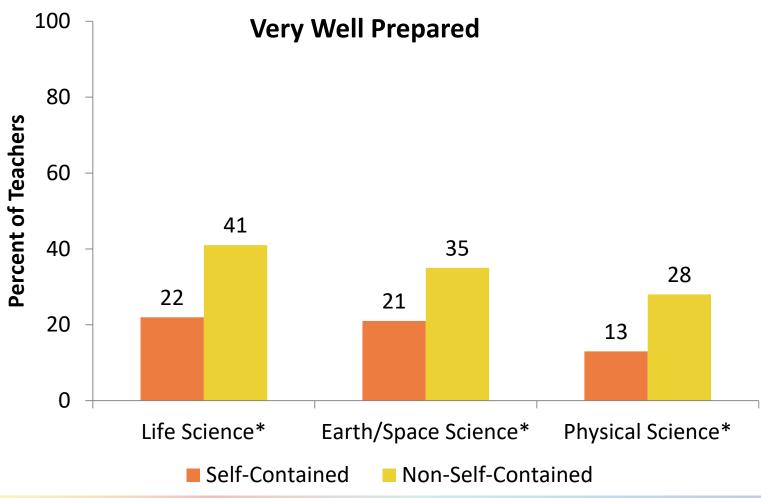








Perceptions of Content Preparedness, by Instructional Arrangement: Grades 3-5









Perceptions of Pedagogical Preparedness

Very Well Prepared

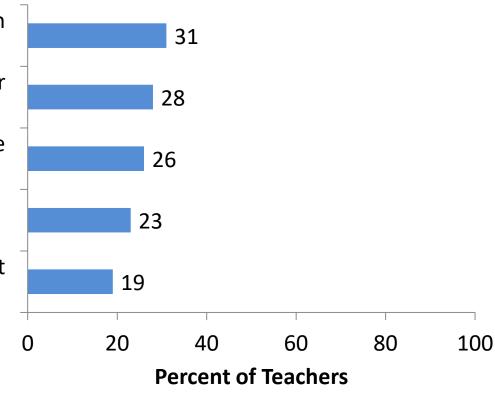
Encourage participation of all students in science and/or engineering

Use formative assessment to monitor student learning

Encourage students' interest in science and/or engineering

Develop students' conceptual understanding

Differentiate science instruction to meet the needs of diverse learners



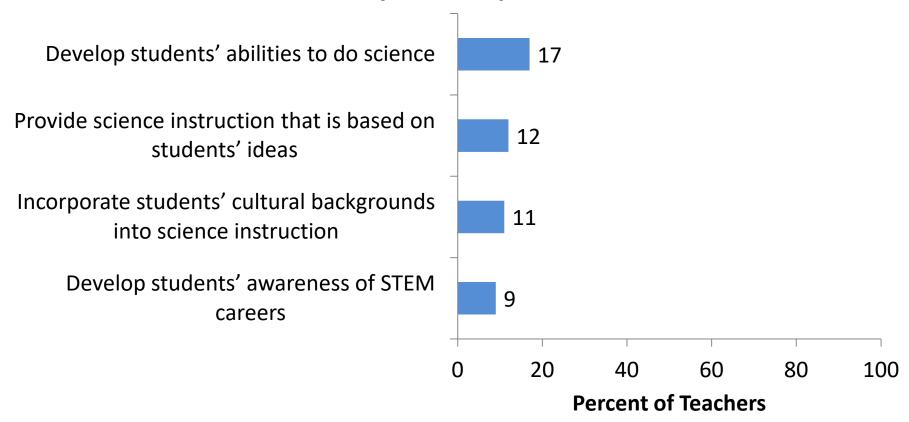






Perceptions of Pedagogical Preparedness

Very Well Prepared



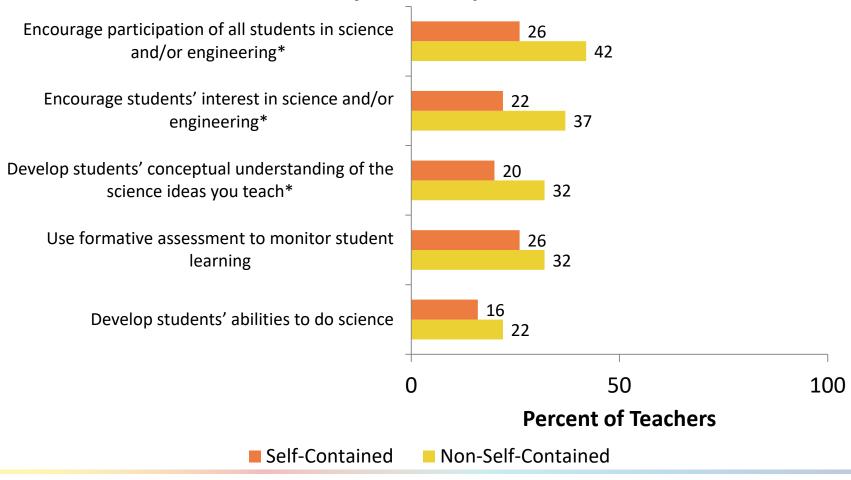






Pedagogical Preparedness: Grades 3-5

Very Well Prepared





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Takeaways

- Elementary teacher beliefs generally align well with the NGSS.
- Only about one-third of elementary teachers meet NSTA's recommendation for course background.
- Elementary teachers generally do not feel well prepared for science instruction.







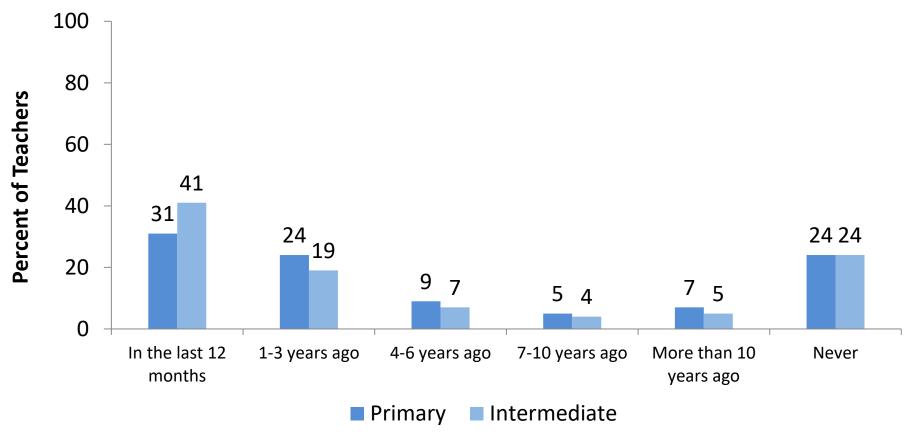
Professional Development (PD)







Most Recent Participation in Science-Focused PD

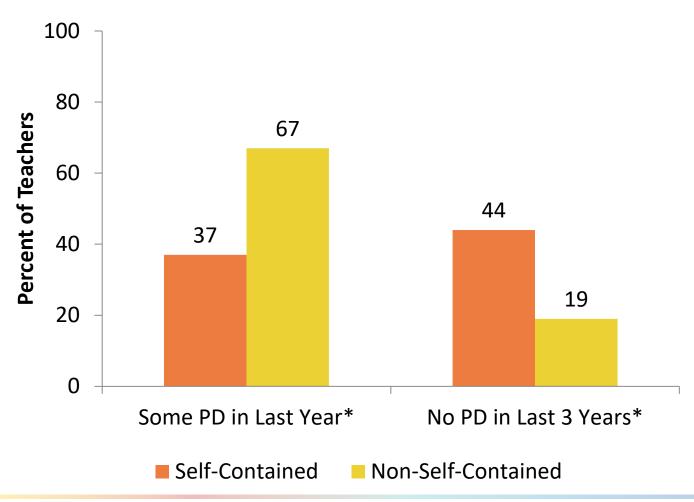








Science PD Participation: Grades 3–5

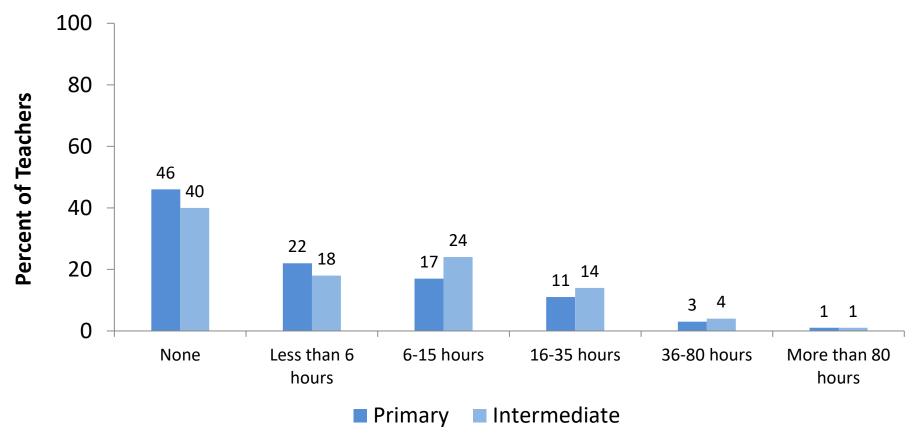








Time Spent on PD in the Previous 3 Years

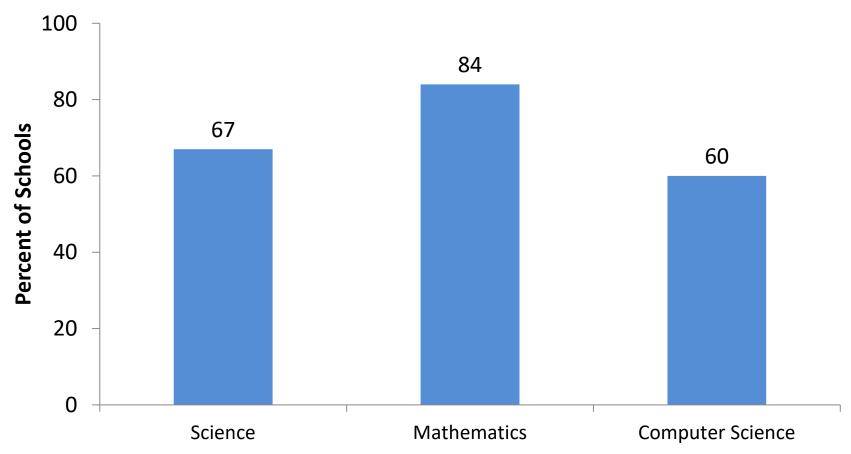








Elementary Schools <u>Offering Any</u> Type of PD in the Last 3 Years









Resources for Instruction







Instructional Materials







Elementary Science Classes for Which Various Types of Instructional Resources Are Designated

Commercially published textbooks*

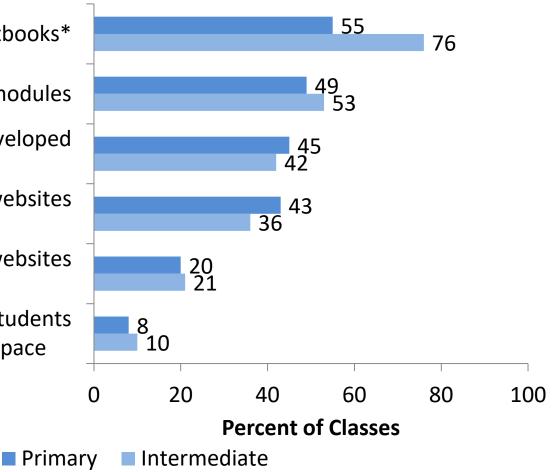
Commercially published kits/modules

State, county, or district-developed units or lessons

Lessons or resources from websites that have a fee

Lessons or resources from websites that are free

Online units or courses that students work through at their own pace

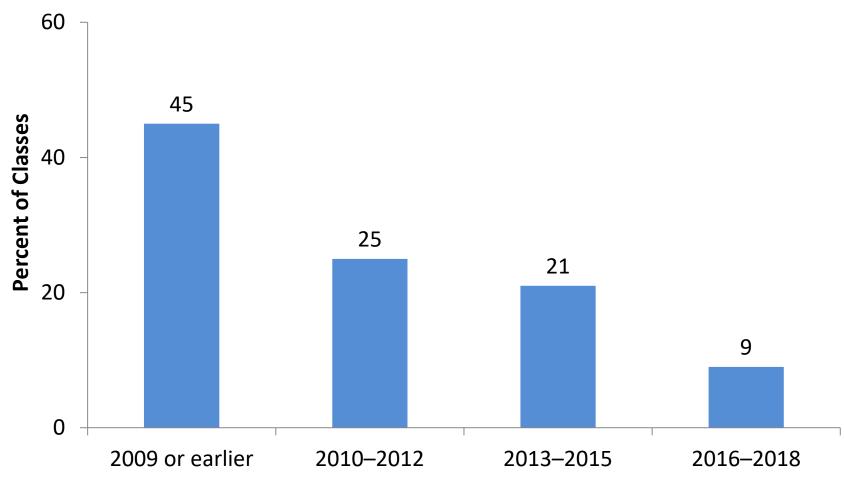








Publication Year of Science Textbooks/Programs

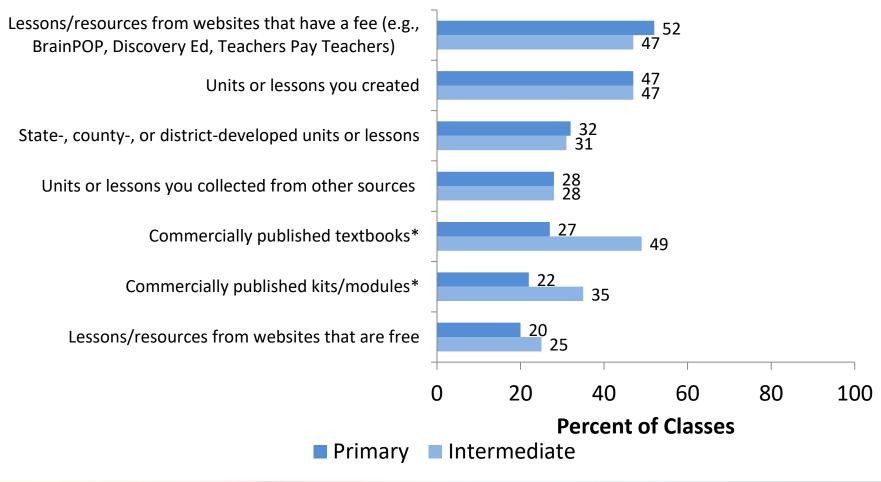








Elementary Science Classes Basing Instruction on Various Instructional Resources at Least Once a Week

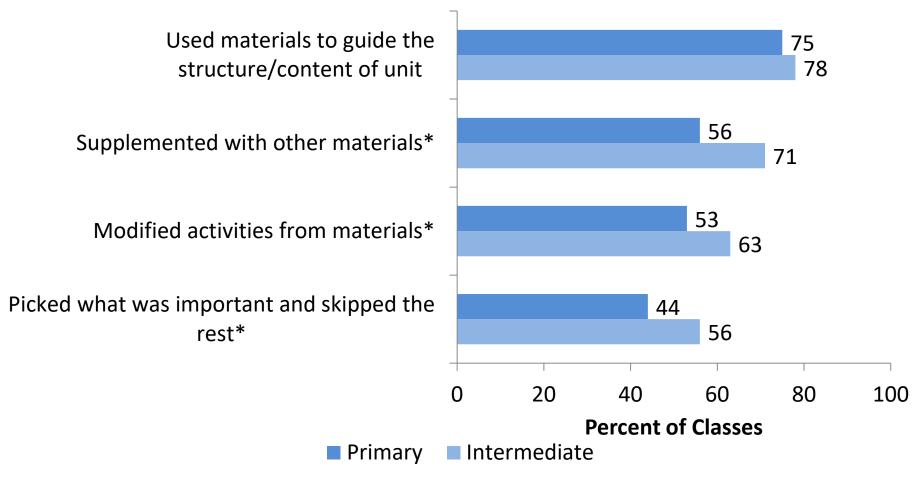








Ways Science Teachers Substantially Used Their Textbook in the Most Recent Unit









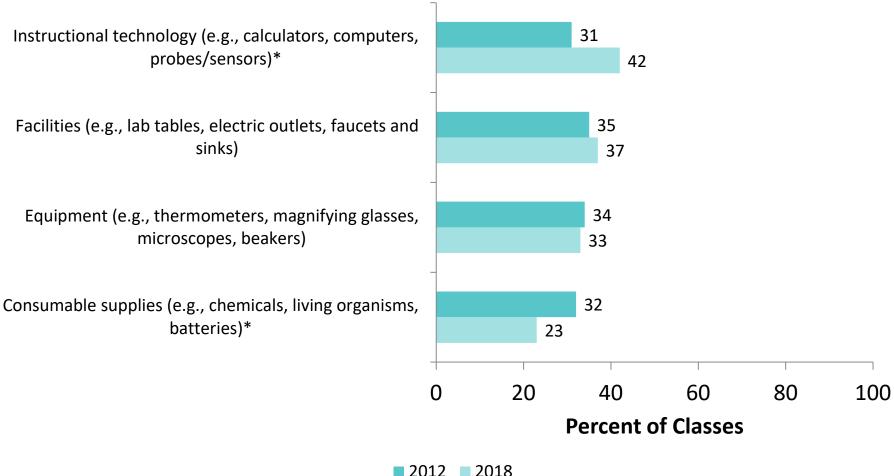
Facilities and Equipment







Classes in Which Teachers Feel Various Resources are Adequate (Primary)

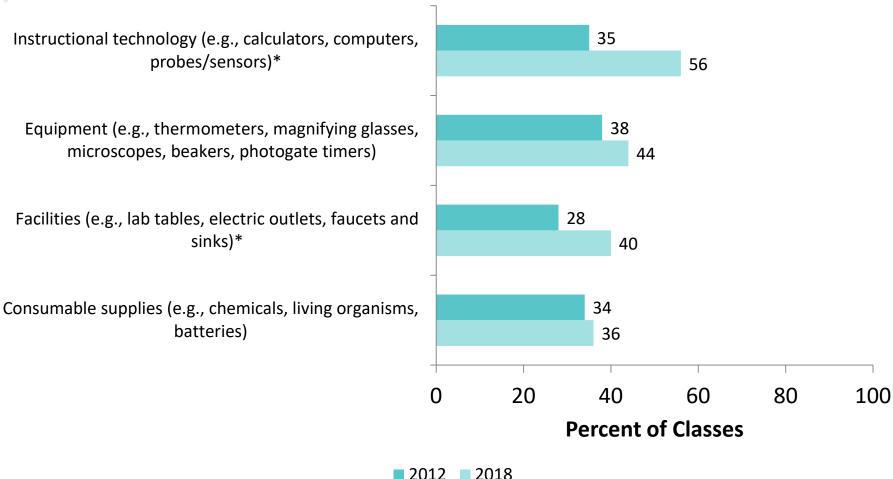








Classes in Which Teachers Feel Various Resources are Adequate (Intermediate)









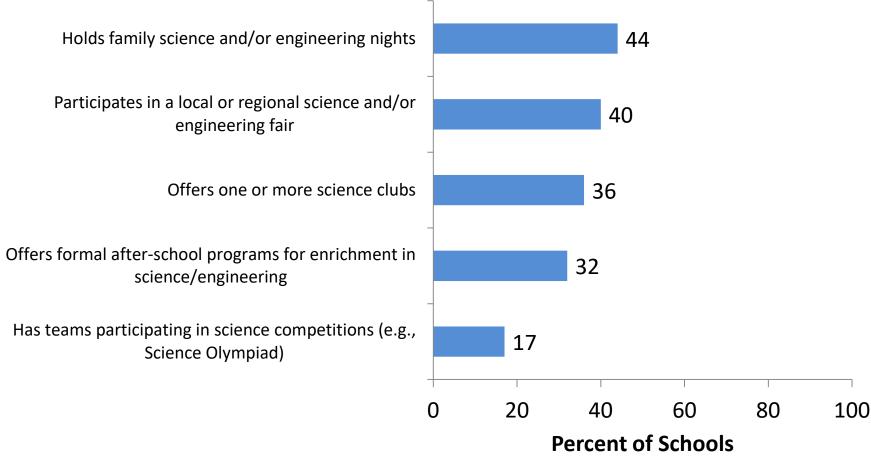
School Practices to Encourage Student Interest and Achievement







Science/Engineering Opportunities Outside of the Classroom

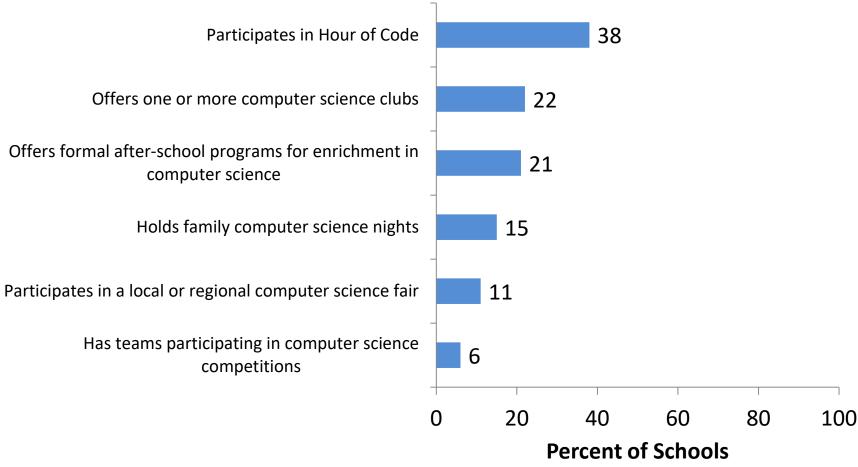








Computer Science Learning Opportunities









State Standards







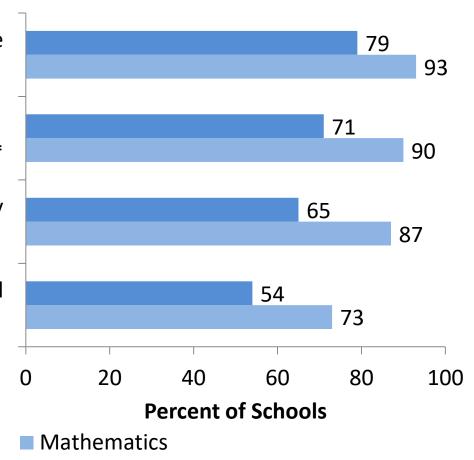
Influence of State Standards

Most teachers in this school teach to the state standards*

There is a school-wide effort to align instruction with the state standards*

State standards have been thoroughly discussed by teachers in this school*

The school/district organizes professional development based on state standards*





Science





Takeaways

- 1. Elementary teachers face systemic and substantial obstacles to providing excellent science instruction.
- 2. Little has changed for the better since 2012. On some indicators, the status of elementary science education has declined.
- 3. Major obstacles to improvement
 - 1. Lack of NGSS-aligned instructional materials.
 - 2. Lack of professional learning opportunities.
 - 3. Low priority given to science relative to reading/language arts and mathematics.



