Appendix C

Observation Data

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Classroom Assessment Scoring System (CLASS)

What is CLASS?

The Classroom Assessment Scoring System (CLASS) is a classroom observation tool developed at the University of Virginia's Curry School of Education. It aims to provide a common lens and language focused on classroom interactions that encourage student learning.

CLASS observations break down the complex classroom environment to help educators focus on boosting the effectiveness of their interactions with learners of all ages. Observations rely on categorizing interactions within the CLASS framework.

The CLASS tool organizes teacher-student interactions into three broad domains: Emotional Support, Classroom Organization, and Instructional Support. The upper elementary and secondary tools include an additional domain, Student Engagement. Within all domains except Student Engagement, interactions are further organized into multiple dimensions. Table 1 lists the domains and dimensions for each level.

Emotional Support: Students' social and emotional functioning in the classroom is increasingly recognized as an indicator of school readiness, a potential target for intervention, and even as a student outcome that might be governed by a set of standards similar to those for academic achievement. Students who are more motivated and connected to others are much more likely to establish positive trajectories of development in both social and academic domains. Teachers' abilities to support social and emotional functioning in the classroom are therefore central to ratings of effective classroom practices.

Classroom Organization: The classroom organization domain assesses a broad array of classroom processes related to the organization and management of students' behavior, time, and attention in the classroom. Classrooms function best and provide the most opportunities for learning when students are well-behaved, consistently have something to do, and are interested and engaged in learning tasks.

Instructional Support: The theoretical foundation for the instructional support domain is based on research on children's cognitive and language development. Thus the emphasis is on students' construction of usable knowledge, rather than rote memorization, and metacognition—or the awareness and understanding of one's thinking process. As a result, the instructional support domain does not make judgments about curriculum content; rather, it assesses the effectiveness of teachers' interactions with students that support cognitive and language development.

Student Engagement: Unlike other domains, student engagement focuses strictly on student functioning, and measures the overall engagement level of students in the classroom.

Table 1: CLASS Domains and Dimensions

Domain	Dimensions			
	Pre-K	**Lower Elementary**	**Upper Elementary**	**Secondary**
Emotional Support	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Positive Climate Negative Climate Teacher Sensitivity Regard for Adolescent Perspectives
Classroom Organization	Behavior Management Productivity Instructional Learning Formats	Behavior Management Productivity Instructional Learning Formats	Behavior Management Productivity Instructional Learning Formats	Behavior Management Productivity Instructional Learning Formats
Instructional Support	Concept Development Quality of Feedback Language Modeling	Concept Development Quality of Feedback Language Modeling	Content Understanding Analysis and Problem Solving Quality of Feedback Instructional Dialogue	Content Understanding Analysis and Problem Solving Quality of Feedback
Student Engagement	n/a	n/a	Student Engagement	Student Engagement

Based on research from the University of Virginia's Curry School of Education and studied in thousands of classrooms nationwide, the CLASS

- focuses on effective teaching
- helps teachers recognize and understand the power of their interactions with students
- aligns with professional development tools
- works across age levels and subjects

CLASS-based professional development tools increase teacher effectiveness, and students in classrooms where teachers are observed to demonstrate and earn higher CLASS scores achieve at higher levels than their peers in classrooms with lower CLASS scores.[1]

[1] Teachstone Inc. http://www.teachstone.org/about-the-class/

CLASS and Program Evaluation

APS conducts CLASS observations for all program evaluation reports, starting in the 2010-11 school year. In the fall of 2010, the Office of Planning and Evaluation recruited retired teachers and administrators to become certified CLASS observers. Certification is managed by the University of Virginia. Trainees undergo in-depth training to help them use the tool effectively in the field. An assessment is used to ensure that the observers have demonstrated reliability with the CLASS tool.

Each observation lasts approximately 30 minutes and observers are instructed to view either the beginning or end of a class. Ten additional minutes are provided for coding of the observation. Self-contained classrooms that serve ESOL/HILT students or students with a disability, as well as mainstream classrooms with ESOL/HILT students or students with a disability, are included.

CLASS Scores

CLASS dimensions are scored on a 7-point scale consisting of Low (1, 2), Mid (3, 4, 5), and High (6, 7) ranges. A score in the low range indicates an absence or lack of the behaviors associated with a given dimension, while a score in the high range indicates a high presence of such behaviors. Scores in the high range are desirable for all dimensions except for Negative Climate. With this dimension, the goal is a low score, or an absence of negativity.

Research Foundations of CLASS

The CLASS framework is derived from developmental theory and research suggesting that interactions between students and adults are the primary mechanism of child development and learning.

Elementary CLASS

Research provides evidence about the types of teacher-student interactions that promote positive social and academic development. The Classroom Assessment Scoring System™ (CLASS) provides a reliable, valid assessment of these interactions[2]

Selected studies demonstrate:

- Higher levels of instructional support are related to preschoolers' gains in pre-reading and math skills.[3]
- High levels of emotional support contribute to preschoolers' social competence in the kindergarten year.[4]
- High levels of emotional support are associated with growth in reading and math achievement from kindergarten through fifth grade.[5]

[2] Karen LaParo, Robert Pianta, and Meghan Stuhlman, "Classroom Assessment Scoring System (CLASS): Findings from the Pre-K Year," Elementary School Journal, 104:5, pages 409-426.
[3] Mashburn, Pianta, Hamre, Downer et al., Child Development,79, pages 732-749.
[4] Timothy Curby, Jennifer Locasale-Crouch, Timothy Konold, Robert Pianta, Carollee Howes, Margaret Burchinal et al., "The Relations of Observed Pre-K Classrooms Quality Profiles to Children's Academic Achievement and Social Competence," Early Education and Development, 19, pages 643-666.
[5] Robert Pianta, Jay Belsky, Nathan Vandergrift, Renee Houts, Fred Morrison, and NICHD-ECCRN, "Classroom Effects on Children's Achievement Trajectories in Elementary School," American Education Research Journal, 49, pages 365-397.

- High levels of classroom organization are associated with gains in first graders' literacy.[6]
- Kindergarten children are more engaged and exhibit greater self-control in classrooms offering more effective teacher-child interactions.[7]
- First-grade children at risk for school failure perform on par with peers, both socially and academically, when exposed to classrooms with effective teacher-student interactions.[8]

Moreover, studies conducted in over 6,000 classrooms provide evidence that students in Pre-K–5 classrooms with higher CLASS ratings realize greater gains in achievement and social skill development.[9]

Secondary CLASS

Research using the more recently developed secondary CLASS tool has shown that teachers' skills in establishing a positive emotional climate, their sensitivity to student needs, and their structuring of their classroom and lessons in ways that recognize adolescents' needs for a sense of autonomy and control, for an active role in their learning, and for opportunities for peer interaction were all associated with higher relative student gains in achievement.[10]

Alignment with APS Initiatives

Differentiation

The four domains measured by the CLASS are essential in effectively differentiated classrooms. In addition, dimensions such as teacher sensitivity, regard for student/adolescent perspectives, and instructional learning formats specifically address behaviors necessary for effective differentiation.

Teacher Evaluation (Danielson)

The CLASS tool is heavily aligned with Charlotte Danielson's Framework for Teaching[11], which sets forth standards for teaching behaviors in the areas of planning, instruction, classroom environment, and professional responsibility. Danielson's Levels of Performance rubrics are the foundation for all T-Scale staff evaluation in APS.

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[6] Claire Cameron Ponitz, Sara Rimm-Kaufman, Laura Brock, and Lori Nathanson, "Contributions of gender, early school adjustment, and classroom organizational climate to first grade outcomes," Elementary School Journal, 110, 142-162.

[7] Sara Rimm-Kaufman, Timothy Curby, Kevin Grimm, Lori Nathanson and Laura Brock, "The Contribution of Children's Self-Regulation and Classroom Quality to Children's Adaptive Behavior in Kindergarten," Developmental Psychology, in-press. See also NICHD ECCRN, "A Day in Third Grade: A Large- Scale Study of Classroom Quality and Teacher and Student Behavior," Elementary School Journal, 105, pages 305-323.

[8] Bridget Hamre and Robert Pianta, "Can Instructional and Emotional Support in First Grade Classrooms Make a Difference for Children At Risk of School Failure?" Child Development, 76, pages 949-967.

[9] Website http://curry.virginia.edu/uploads/resourceLibrary/CLASS-MTP_PK-12_brief.pdf Center for Advanced Study of Teaching and Learning Charlottesville, Virginia, **Measuring and Improving Teacher-Student Interactions in PK-12 Settings to Enhance Students' Learning**

[10] Joseph P. Allen, Anne Gregory, Amori Mikami, Janetta Lun, Bridget Hamre, and Robert C. Pianta, "Observations of Effective Teaching in Secondary School Classrooms: Predicting Student Achievement with the CLASS-S."

[11] Charlotte Danielson (2007), *Enhancing Professional Practice: A Framework for Teaching*, Alexandria, VA: ASCD.

Cultural Competence

There is strong alignment between Gay's Exemplars of Culturally Responsive Behaviors[12] and classroom behaviors identified in the CLASS tool. The APS Council for Cultural Competence was established in 2003 to develop the framework for permanent, system-wide cultural competence activities including ongoing cultural competence training for all staff. Cultural competence is a set of attitudes, skills, behaviors, and policies that enable organizations and staff to work effectively in cross-cultural situations.

SIOP

Many of the dimensions of the CLASS are aligned with components of the Sheltered Instruction Observation Protocol (SIOP)[13], an approach to teaching that promotes content-area learning and language development for English language learners. SIOP encourages teachers to adapt grade-level content lessons to students' levels of English proficiency while focusing on English language development to help students increase their proficiency in academic English.

[12] Geneva Gay (2000). *Culturally Responsive Teaching: Theory, Research, & Practice.* New York: Teachers College Press.
[13] Website http://siop.pearson.com/about-siop

Alignment of the Classroom Assessment Scoring System (CLASS) With APS Best Instructional Practices

Domain/ Dimension	Grades Observed	Description of CLASS Dimensions	Alignment with			
			Differentiation[1]	Responsive Education[2]	Danielson[3]	SIOP[4]
Emotional Support						
Positive Climate	Pre-K - 12	Reflects the emotional connection and relationships among teachers and students, and the warmth, respect, and enjoyment communicated by verbal and non-verbal interactions.		X	X	
Negative Climate	Pre-K - 12	Reflects the overall level of expressed negativity among teachers and students in the classroom; the frequency, quality, and intensity of teacher and student negativity are important to observe.		X	X	
Teacher Sensitivity	Pre-K - 12	Encompasses the teacher's awareness and responsiveness to the academic, social-emotional, and developmental needs of individual students and the entire class. At the younger levels, it also includes the teacher's ability to consistently provide comfort, reassurance, and encouragement.	X	X	X	X
Regard for *Student/Adolescent* Perspective	Pre-K – 3	*Student:* At the younger levels, it captures the degree to which the teacher's interactions with students and classroom activities place an emphasis on students' interests, motivations, and points of view and encourage student responsibility and autonomy.	X	X	X	X
	4-12	*Adolescent:* At the older levels, it focuses on the extent to which the teacher is able to meet and capitalize on the social and developmental needs and goals of (pre)adolescents by providing opportunities for student autonomy and leadership. Also considered are the extent to which student ideas and opinions are valued and content is made useful and relevant to (pre)adolescents.	X	X	X	X
Classroom Organization						
Behavior Management	Pre-K - 12	Encompasses the teacher's use of clear behavioral expectations and effective methods to prevent and redirect misbehavior.		X	X	
Productivity	Pre-K - 12	Considers how well the teacher manages time and routines so that instructional time is maximized.			X	
Instructional Learning Formats	Pre-K - 12	Focuses on the ways in which the teacher maximizes students' interest and engagement in learning. This includes the teacher's use of interesting and engaging lessons and materials, active facilitation, and clarity of learning objectives.	X	X	X	X

[1] Differentiation or differentiated instruction is an approach that recognizes that all students must master a common body of knowledge and skills, but each student learns a different way and needs an approach most appropriate to his or her learning needs. Differentiation relates to content (what students learn), process (how students learn), and product (how students demonstrate what they've learned). Students differ in readiness (prior mastery of knowledge, understandings, and skills), interest (curiosity and passion to know, understand, or do more), and how they prefer to learn (Tomlinson, 1999).

[2] Responsive education or culturally responsive teaching is a pedagogy that recognizes the importance of including students' cultural references in all aspects of learning (Ladson-Billings, 1994).

Alignment of the Classroom Assessment Scoring System (CLASS) With APS Best Instructional Practices

Domain/ Dimension	Grades Observed	Description of CLASS Dimensions	Alignment with			
			Differentiation[1]	Responsive Education[2]	Danielson[3]	SIOP[4]
Instructional Support						
Concept Development	Pre-K – 3	Measures the teacher's use of instructional discussions and activities to promote students' higher-order thinking skills and cognition and the teacher's focus on understanding rather than on rote instruction.	X		x	X
Content Understanding	4-12	Refers to both the depth of the lesson content and the approaches used to help students comprehend the framework, key ideas, and procedures in an academic discipline. At a high level, this refers to interactions among the teacher and students that lead to an integrated understanding of facts, skills, concepts, and principles.		X	X	X
Analysis and Problem Solving	4-12	Assesses the degree to which the teacher facilitates students' use of higher-level thinking skills, such as analysis, problem solving, reasoning, and creation through the application of knowledge and skills. Opportunities for demonstrating metacognition, i.e. thinking about thinking, are also included.	X	X		X
Quality of Feedback	Pre-K - 12	Assesses the degree to which feedback expands and extends learning and understanding and encourages student participation. (At the secondary level, significant feedback may be provided by peers)		X	X	X
Language Modeling	Pre-K-3	Captures the quality and amount of the teacher's use of language-stimulation and language-facilitation techniques.			X	X
Instructional Dialogue	4-5	Captures the purposeful use of dialogue- structured, cumulative questioning and discussion which guide and prompt students- to facilitate students' understanding of content and language development. The extent to which these dialogues are distributed across all students in the class and across the class period is important to this rating.			X	X
Student Engagement	4-12	Intended to capture the degree to which all students in the class are focused and participating in the learning activity presented or facilitated by the teacher. The difference between passive engagement and active engagement is of note in this rating.		X	X	X

[3] Danielson's Domains of Teaching Responsibility frame the APS teacher evaluation process and are based on Charlotte Danielson's Enhancing Professional Practice. The domains are the areas in which T-Scale employees are evaluated and are the foundation for Best Instructional Practices. For classroom based teachers they include: Planning and Preparation, Classroom Environment, Instruction and Professional Responsibilities. For non-classroom-based teachers the domains are: Planning and Preparation, Environment, Delivery of Service, and Professional Responsibilities.

[4] Sheltered instruction Observation Protocol (SIOP) is an approach to teaching that promotes content-area learning and language development for English language learners. Teachers adapt grade-level content lessons to the students' levels of English proficiency, while focusing on English language development to help students increase their proficiency in academic English.

Classroom Assessment Scoring System (CLASS)

Domain and Dimension Scores

CLASS is an observation tool developed at the University of Virginia's Curry School of Education to help analyze the interactions between teachers and their students in order to boost the effectiveness of teaching and learning.

The CLASS tool organizes these teacher-student interactions into three broad domains: Emotional Support, Classroom Organization, and Instructional Support. The upper elementary and secondary tool includes a fourth domain: Student Engagement.

The Emotional Support domain contains four categories: Positive Climate, Negative Climate, Teacher Sensitivity, and Regard for Student Perspectives (K–5) or Regard for Adolescent Perspectives (6–12). The Classroom Organization domain contains three categories: Behavior Management, Productivity, and Instructional Learning Formats. The Instructional Support domain contains three categories for K–3 students: Concept Development, Quality of Feedback, and Language Modeling. It contains three categories for students in grades 6–12: Content Understanding, Analysis and Problem Solving, and Quality of Feedback. The same three categories, plus one more: Instructional Dialogue, are used to assess grades 4 and 5 classrooms.

Scores are assigned for each category within the domains on a scale of 1 to 7, with 7 being the best possible score. However, the category of "negative climate" (found under the domain of Emotional Support) uses a reverse scale. Therefore, a score of 1 is considered best for this category, since it indicates a lack of negative climate.

Over the course of two years (2011-12 and 2012-13), certified CLASS observers visited approximately 700 classrooms to obtain the data reflected in this report. Roughly 59% of the classes observed were elementary Science classes; 16% were middle school Science classes; and 25% were high school Science classes. In addition, self-contained special education Science classes, ESOL/HILT Science classes that serve LEP (limited English proficient) students, and Spanish immersion Science classes were also observed for this report.

Table 1: Number of Self-Contained and Immersion Science Classes Observed with CLASS

		# of Self-Contained and Immersion Classes Observed		
		ESOL/HILT	Special Education	Spanish Immersion
2011-12	Elementary School	13	5	9
	Middle School	5	11	n/a
	High School	6	5	n/a
2012-13	Elementary School	1	4	6
	Middle School	6	8	n/a
	High School	7	6	n/a

Table 2 shows (1) the total number of classes observed at each school level and within each CLASS domain and dimension for the 2011-12 school year, (2) the mean score (scale of 1–7) achieved within these groups, and (3) the associated standard deviation.

Table 2: Average Domain and Dimension Scores for 2011-12

Average Domain and Dimension Scores	Elementary School			Middle School			High School		
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	N	Mean	Std. Deviation
Emotional Support	226	5.6	0.8	60	5.7	0.7	94	5.9	0.7
Positive Climate	226	5.7	1.1	60	5.6	0.9	94	6.1	0.9
Negative Climate*	226	1.2	0.7	60	1.4	1.0	94	1.2	0.6
Teacher Sensitivity	226	5.5	1.1	60	5.5	1.1	94	5.7	1.0
Regard for Student Perspectives (K–5)	224	4.6	1.4	n/a	n/a	n/a	n/a	n/a	n/a
Regard for Adolescent Perspectives (6–12)	n/a	n/a	n/a	60	5.0	1.2	94	5.1	1.3
Classroom Organization	224	5.8	0.9	60	5.6	0.8	94	5.6	1.0
Behavior Management	222	5.9	1.2	60	5.7	1.0	94	5.7	1.2
Productivity	224	5.9	1.1	60	5.7	0.9	94	5.7	1.2
Instructional Learning Formats	224	5.6	1.1	60	5.4	1.0	94	5.4	1.1
Instructional Support	226	4.4	1.4	60	4.8	1.3	94	5.1	1.0
Content Understanding (4–12)	66	5.0	1.4	60	5.1	1.4	94	5.4	1.2
Analysis and Problem Solving (4–12)	66	4.2	1.6	60	4.5	1.6	94	4.5	1.3
Concept Development (K–3)	159	4.3	1.5	n/a	n/a	n/a	n/a	n/a	n/a
Quality of Feedback (all grades)	226	4.5	1.4	60	4.9	1.3	94	5.3	1.1
Language Modeling (K–3)	160	4.3	1.6	n/a	n/a	n/a	n/a	n/a	n/a
Instructional Dialogue (4–5)	66	4.5	1.6	n/a	n/a	n/a	n/a	n/a	n/a
Student Engagement (4–12)	66	6.0	1.1	60	5.5	1.1	94	5.6	1.2

*A lower score is desirable for the Negative Climate dimension. The Negative Climate score is reversed when calculating the Emotional Support domain score.

Table 3 shows (1) the number of classes observed at each school level and within each CLASS domain and dimension for the 2012-13 school year, (2) the mean score (scale of 1–7) achieved within these groups, and (3) the associated standard deviation.

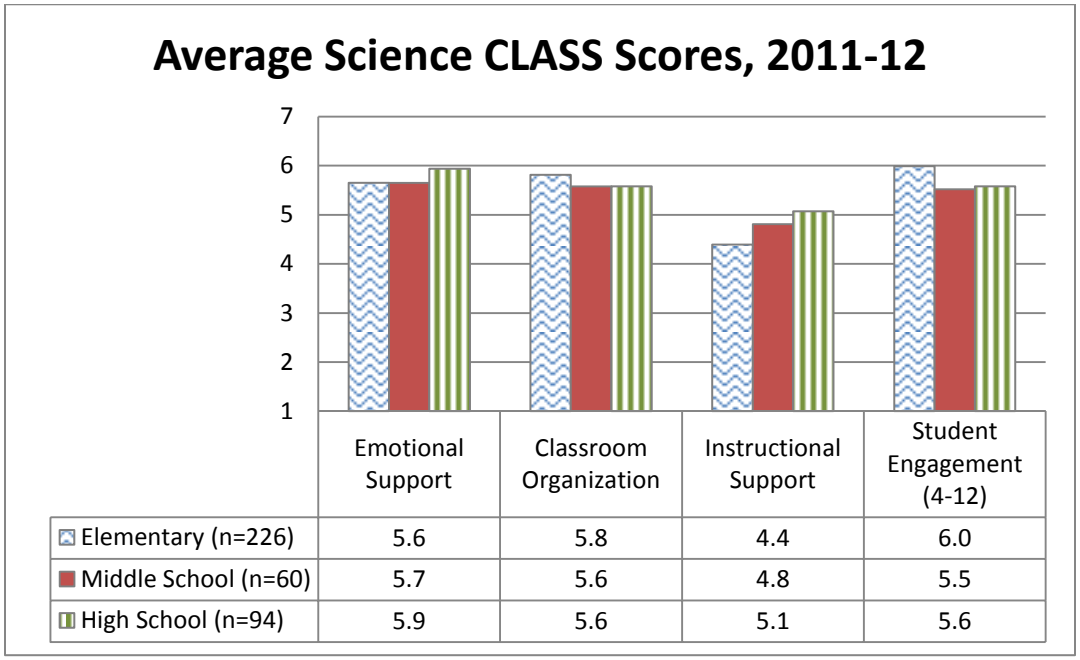
Table 3: Average Domain and Dimension Scores for 2012-13

Average Domain and Dimension Scores	Elementary School			Middle School			High School		
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	N	Mean	Std. Deviation
Emotional Support	192	5.7	0.7	54	6.0	0.7	81	6.0	0.7
Positive Climate	192	5.7	1.0	54	6.0	0.8	81	6.0	0.8
Negative Climate*	192	1.1	0.6	54	1.2	0.6	81	1.1	0.5
Teacher Sensitivity	192	5.6	1.0	54	5.7	0.9	81	5.8	0.8
Regard for Student Perspectives (K-5)	192	4.8	1.2	n/a	n/a	n/a	n/a	n/a	n/a
Regard for Adolescent Perspectives (6-12)	n/a	n/a	n/a	53	5.5	1.0	80	5.4	1.2
Classroom Organization	192	5.9	0.9	54	5.7	1.0	81	5.8	0.8
Behavior Management	192	5.9	1.0	54	5.6	1.2	81	5.9	0.8
Productivity	191	5.9	1.1	54	5.9	1.1	81	5.9	0.9
Instructional Learning Formats	191	5.8	1.0	54	5.5	1.3	81	5.6	1.1
Instructional Support	192	4.5	1.3	54	5.2	1.1	81	5.3	1.2
Content Understanding (4-12)	51	4.9	1.2	53	5.3	1.2	81	5.3	1.3
Analysis and Problem Solving (4-12)	51	4.0	1.4	54	5.0	1.3	81	5.1	1.4
Concept Development (K-3)	141	4.4	1.4	n/a	n/a	n/a	n/a	n/a	n/a
Quality of Feedback (all grades)	192	4.6	1.5	53	5.2	1.1	81	5.4	1.1
Language Modeling (K-3)	141	4.6	1.5	n/a	n/a	n/a	n/a	n/a	n/a
Instructional Dialogue (4-5)	51	4.2	1.7	n/a	n/a	n/a	n/a	n/a	n/a
Student Engagement (4-12)	51	5.7	1.1	54	5.9	0.9	81	6.0	0.9

*A lower score is desirable for the Negative Climate dimension. The Negative Climate score is reversed when calculating the Emotional Support domain score.

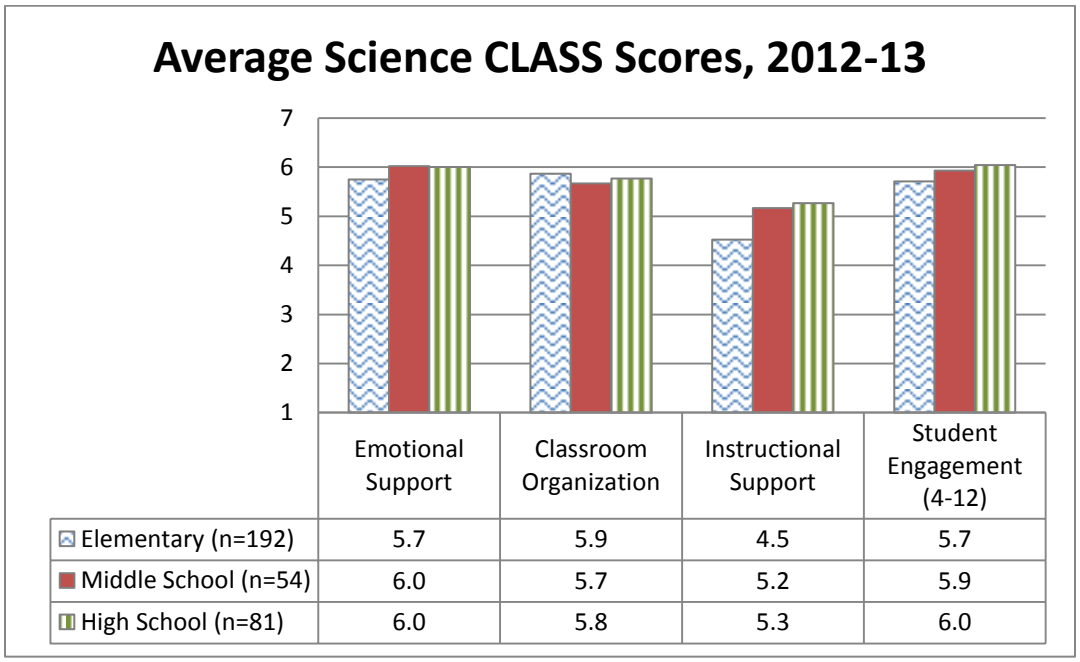
Figure 1 and **Figure 2** show the average CLASS scores for each domain by school level for the 2011-12 and 2012-13 school years, respectively.

Figure 1: Average Science CLASS Scores by Domain and Grade Level, 2011-12



	Emotional Support	Classroom Organization	Instructional Support	Student Engagement (4-12)
Elementary (n=226)	5.6	5.8	4.4	6.0
Middle School (n=60)	5.7	5.6	4.8	5.5
High School (n=94)	5.9	5.6	5.1	5.6

Figure 2: Average Science CLASS Scores by Domain and Grade Level, 2012-13



	Emotional Support	Classroom Organization	Instructional Support	Student Engagement (4-12)
Elementary (n=192)	5.7	5.9	4.5	5.7
Middle School (n=54)	6.0	5.7	5.2	5.9
High School (n=81)	6.0	5.8	5.3	6.0

Figures 3, 4, and 5 display score distribution within the Emotional Support domain for Science classes at the elementary, middle, and high school levels, respectively, during the 2011-12 school year.

Figure 3: Elementary School CLASS Score Distribution for Emotional Support, 2011-12

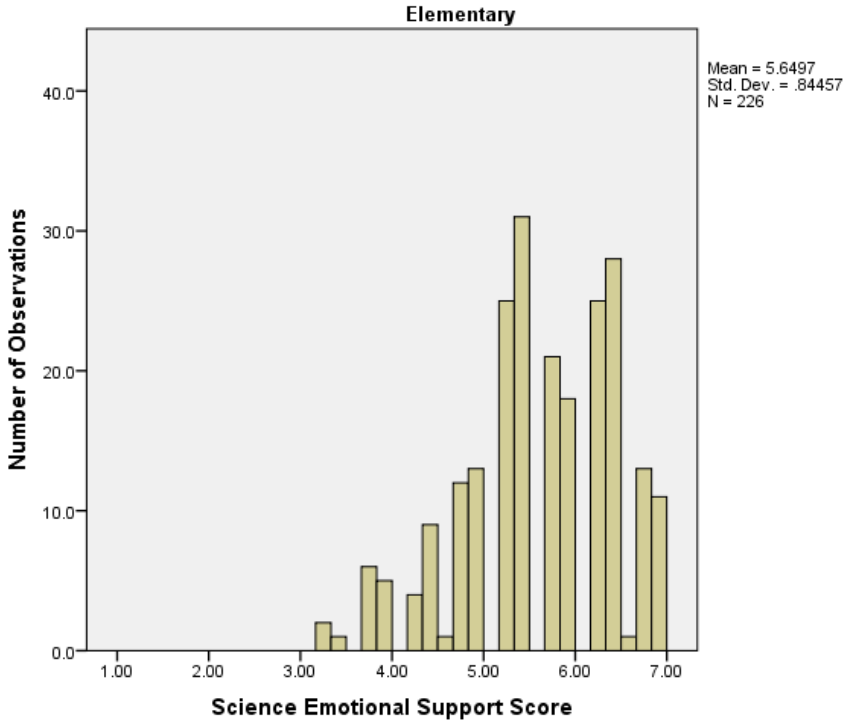


Figure 4: Middle School CLASS Score Distribution for Emotional Support, 2011-12

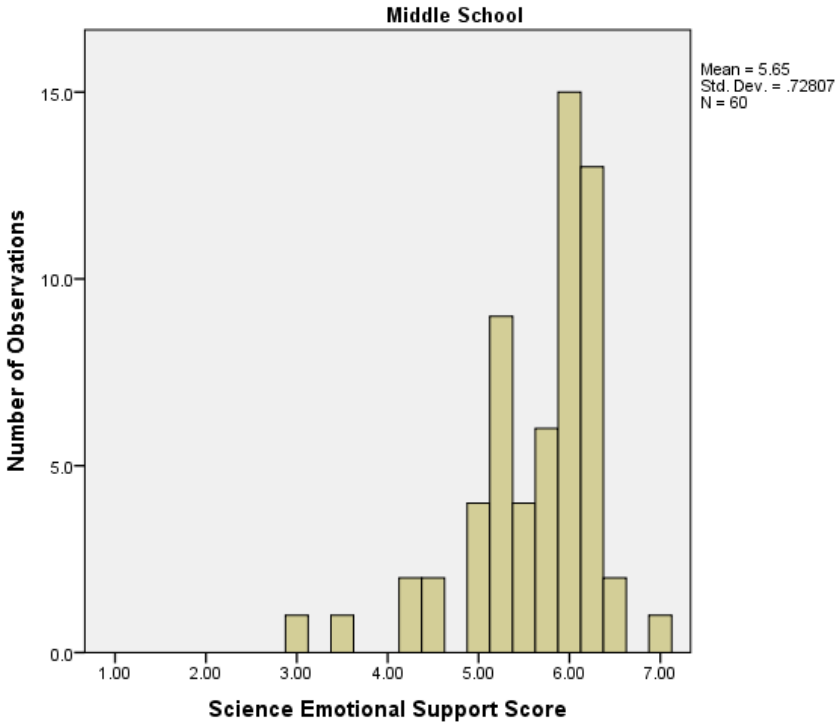
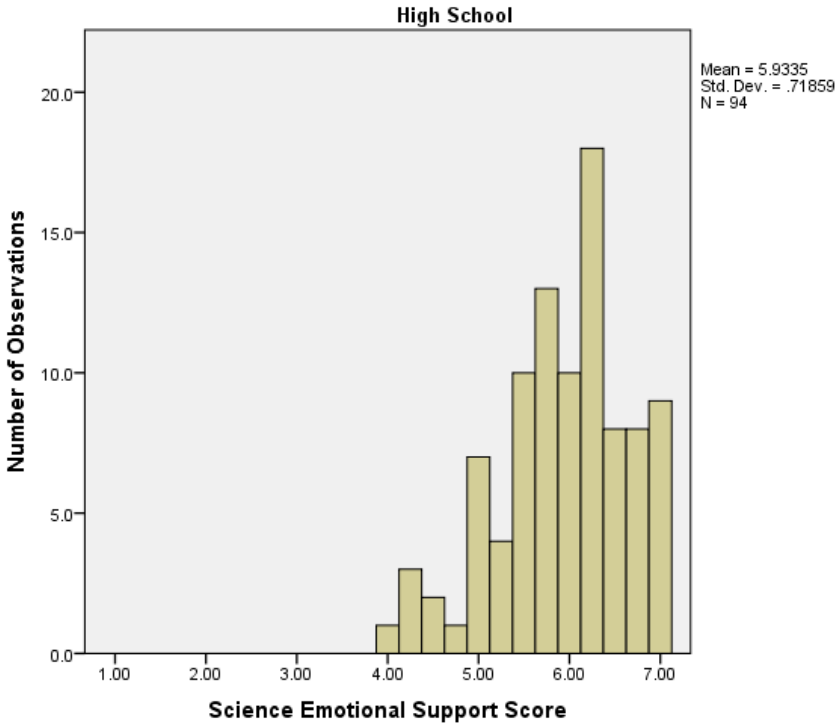


Figure 5: High School CLASS Score Distribution for Emotional Support, 2011-12



Figures 6, 7, and 8 display score distribution within the Classroom Organization domain for Science classes at the elementary, middle, and high school levels, respectively, during the 2011-12 school year.

Figure 6: Elementary School CLASS Score Distribution for Classroom Organization, 2011-12

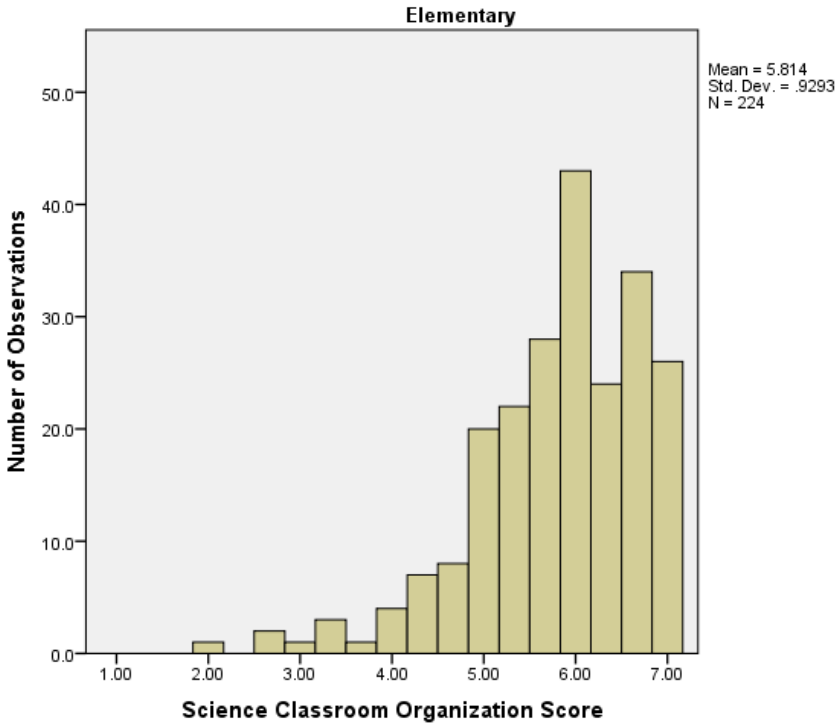


Figure 7: Middle School CLASS Score Distribution for Classroom Organization, 2011-12

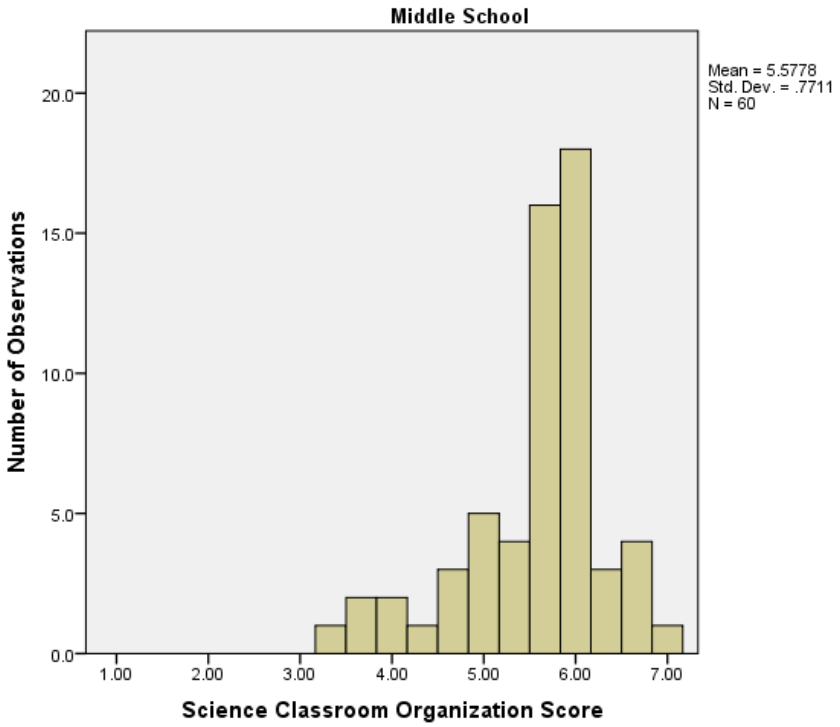
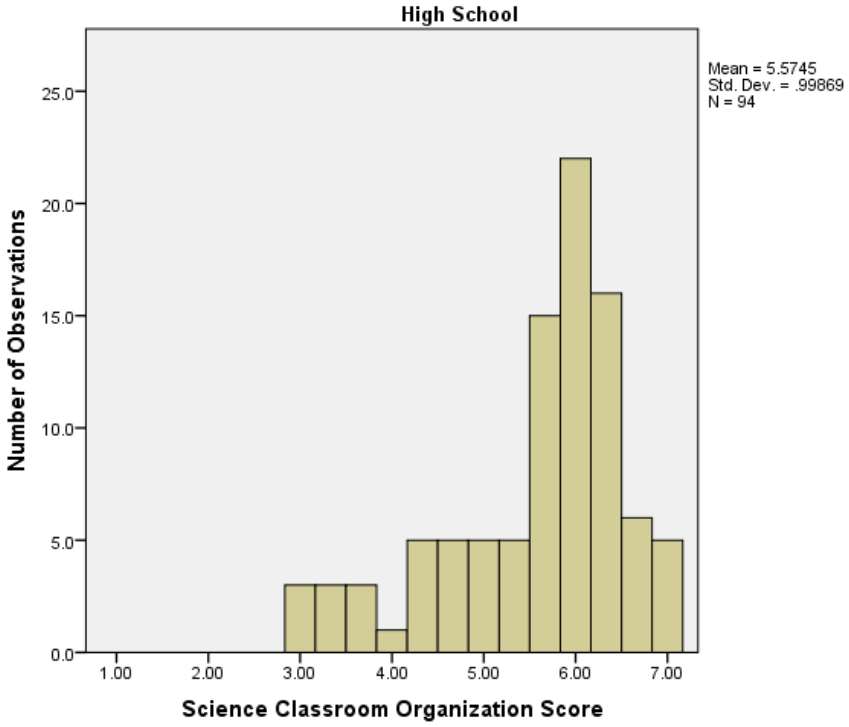


Figure 8: High School CLASS Score Distribution for Classroom Organization, 2011-12



Figures 9, 10, and 11 display score distribution within the Instructional Support domain for Science classes at the elementary, middle, and high school levels, respectively, during the 2011-12 school year.

Figure 9: Elementary School CLASS Score Distribution for Instructional Support, 2011-12

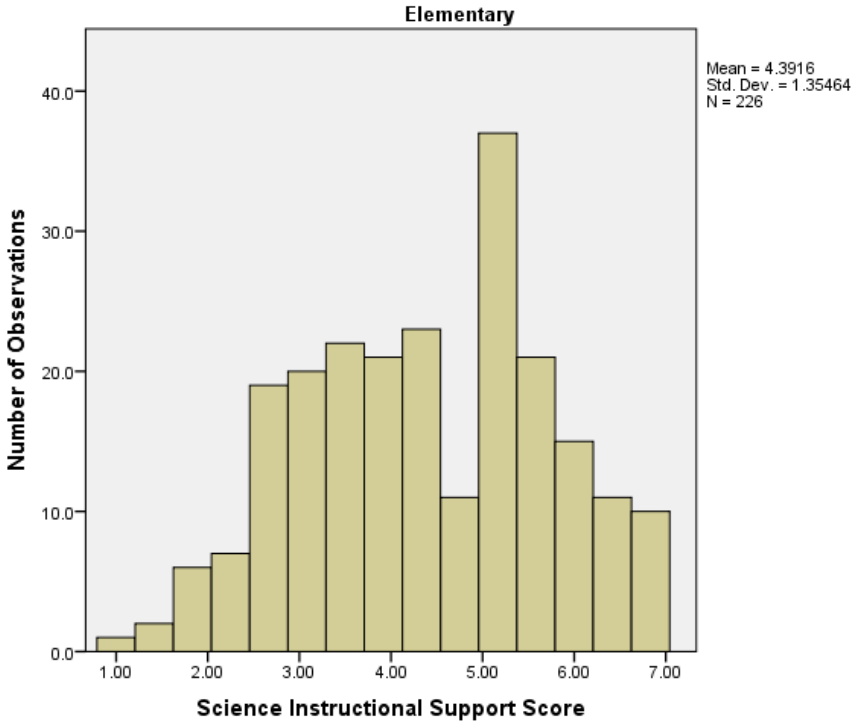


Figure 10: Middle School CLASS Score Distribution for Instructional Support, 2011-12

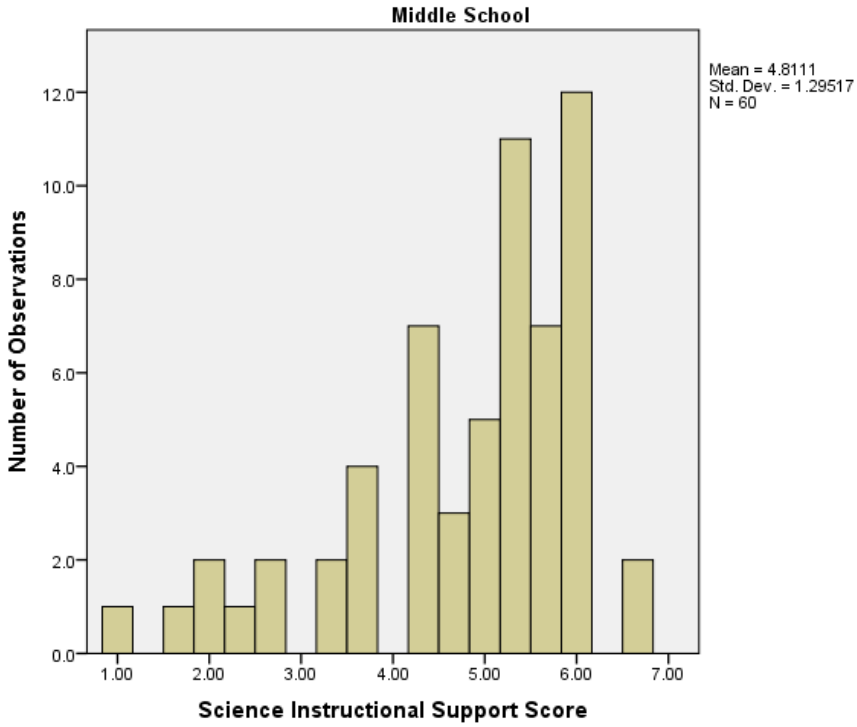
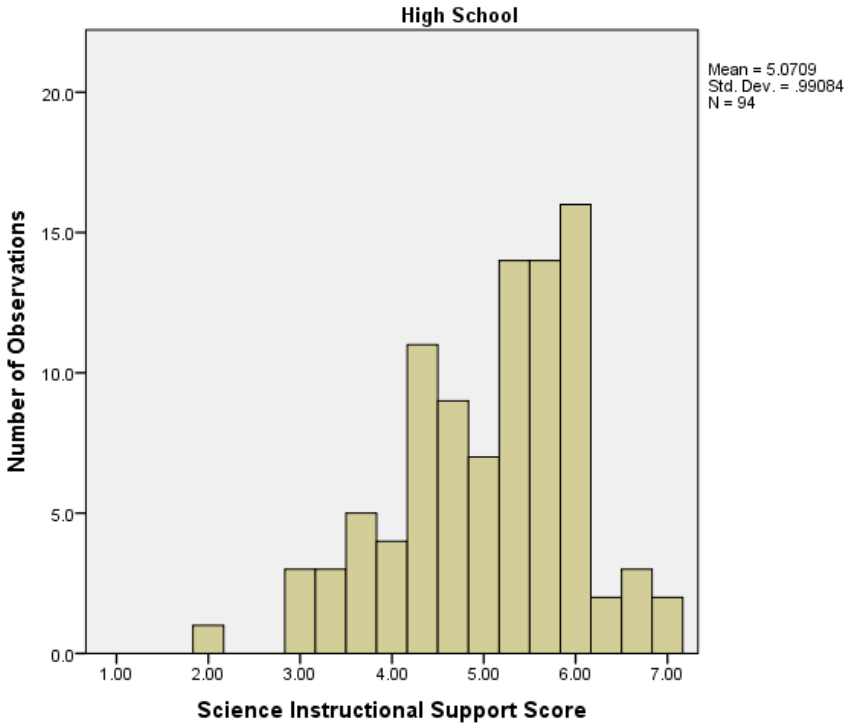


Figure 11: High School CLASS Score Distribution for Instructional Support, 2011-12



Figures 12, 13, and 14 display score distribution within the Student Engagement domain for Science classes at the elementary, middle, and high school levels, respectively, during the 2011-12 school year.

Figure 12: Elementary School CLASS Score Distribution for Student Engagement, 2011-12

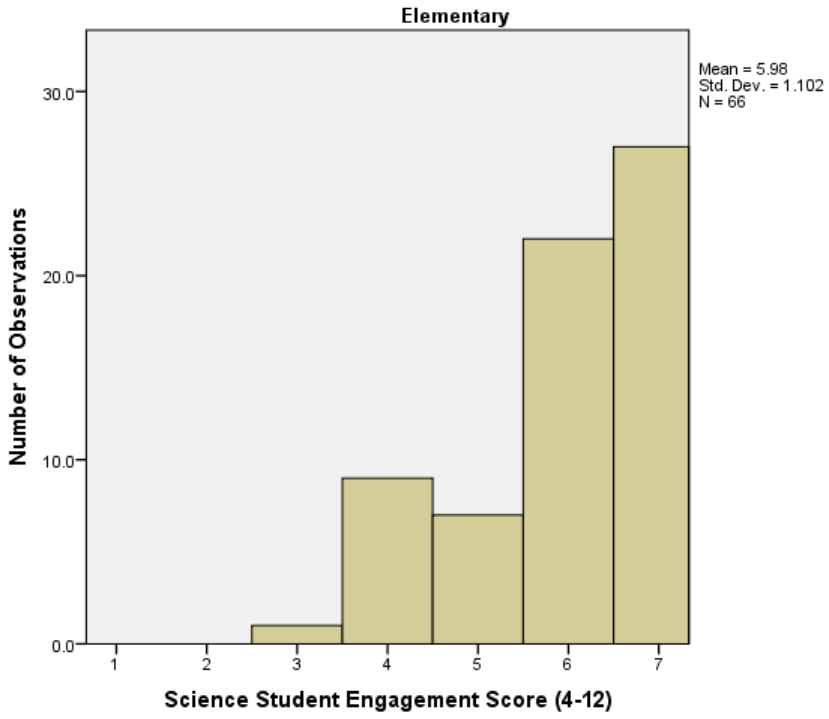


Figure 13: Middle School CLASS Score Distribution for Student Engagement, 2011-12

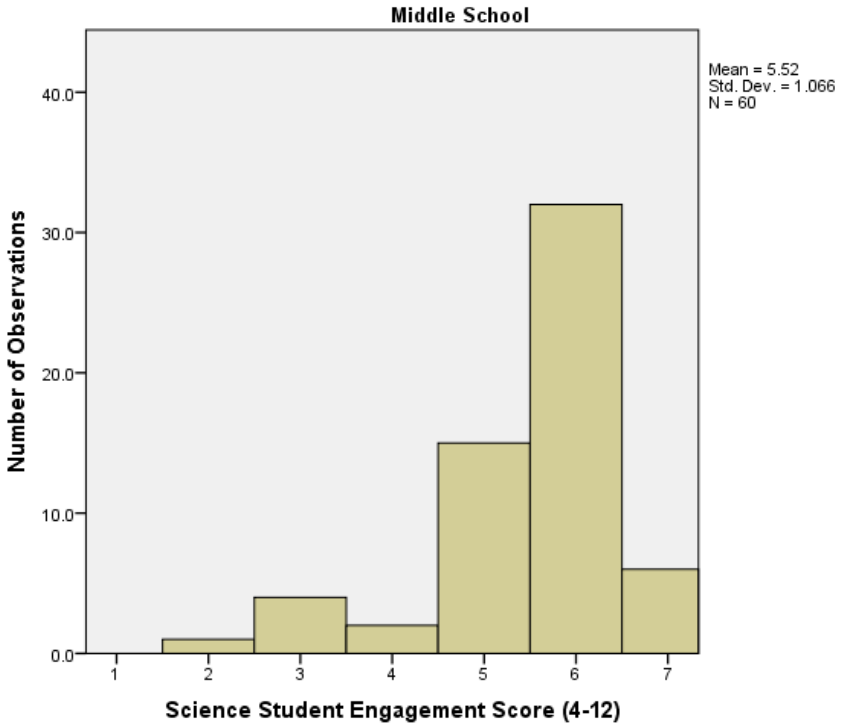
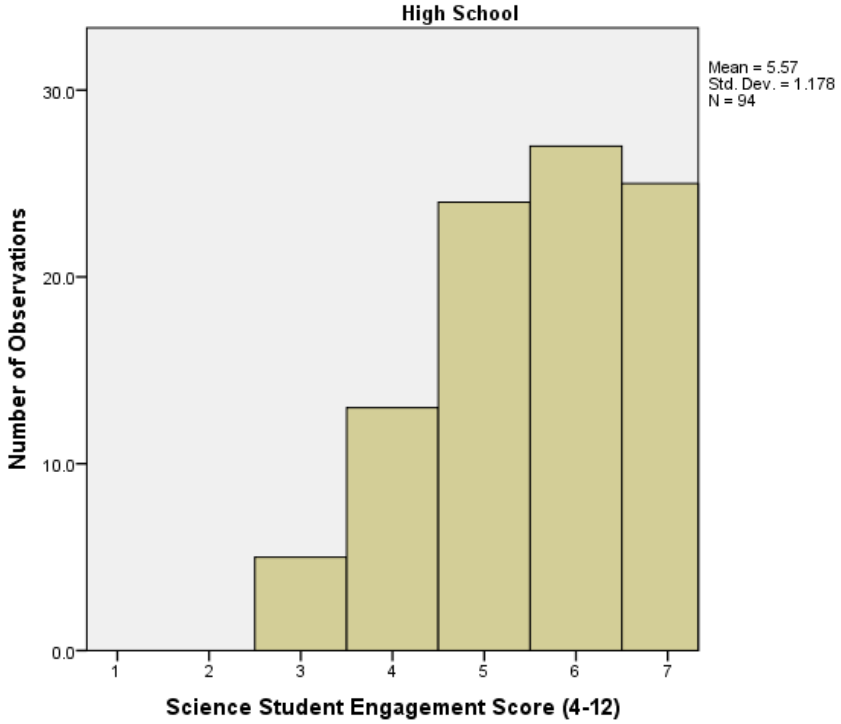


Figure 14: High School CLASS Score Distribution for Student Engagement, 2011-12



Figures 15, 16, and 17 display score distribution within the Emotional Support domain for Science classes at the elementary, middle, and high school levels, respectively, during the 2012-13 school year.

Figure 15: Elementary School CLASS Score Distribution for Emotional Support, 2012-13

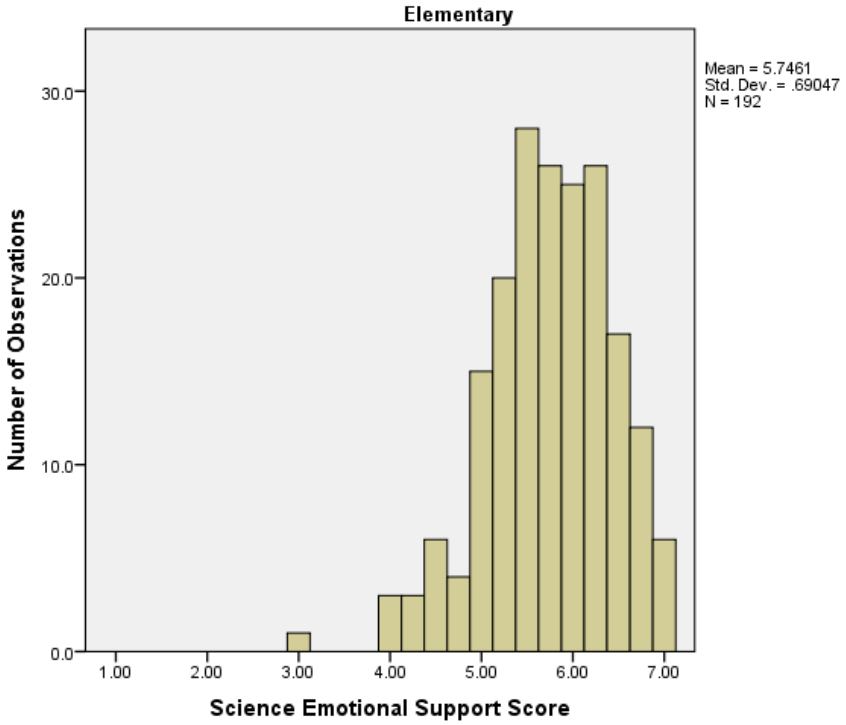


Figure 16: Middle School CLASS Score Distribution for Emotional Support, 2012-13

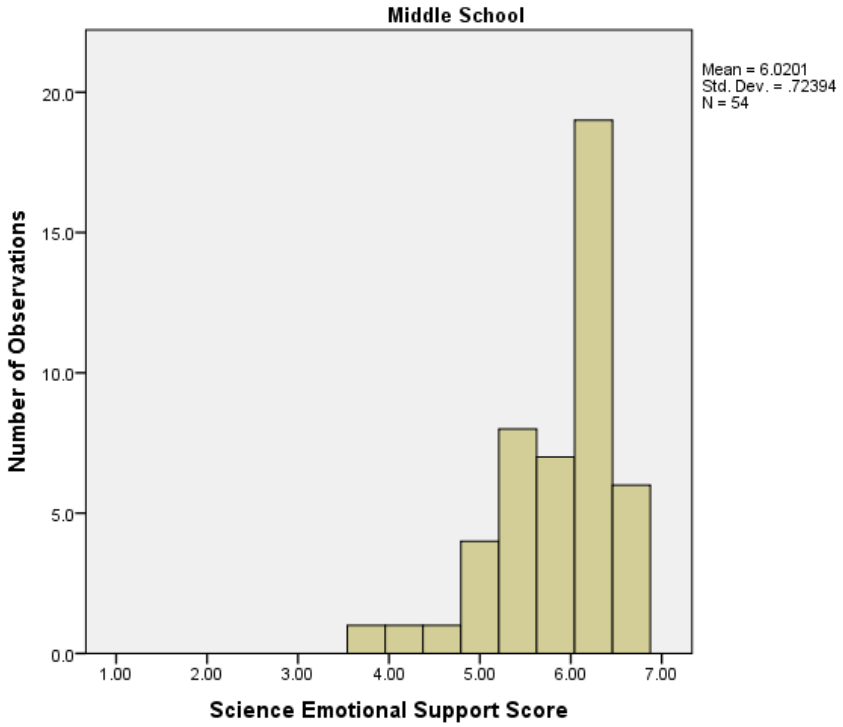
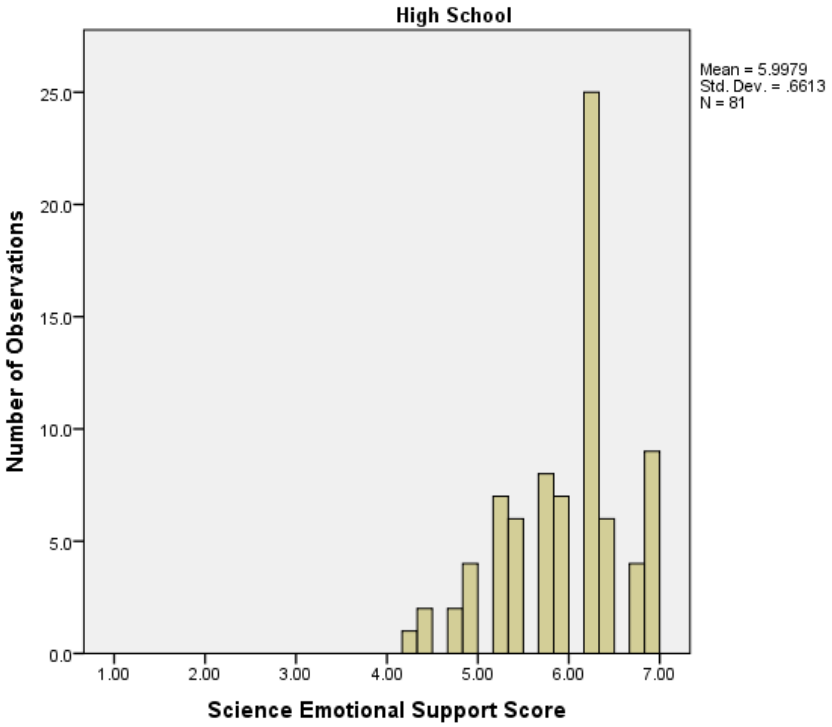


Figure 17: High School CLASS Score Distribution for Emotional Support, 2012-13



Figures 18, 19, and 20 display score distribution within the Classroom Organization domain for Science classes at the elementary, middle, and high school levels, respectively, during the 2012-13 school year.

Figure 18: Elementary School CLASS Score Distribution for Classroom Organization, 2012-13

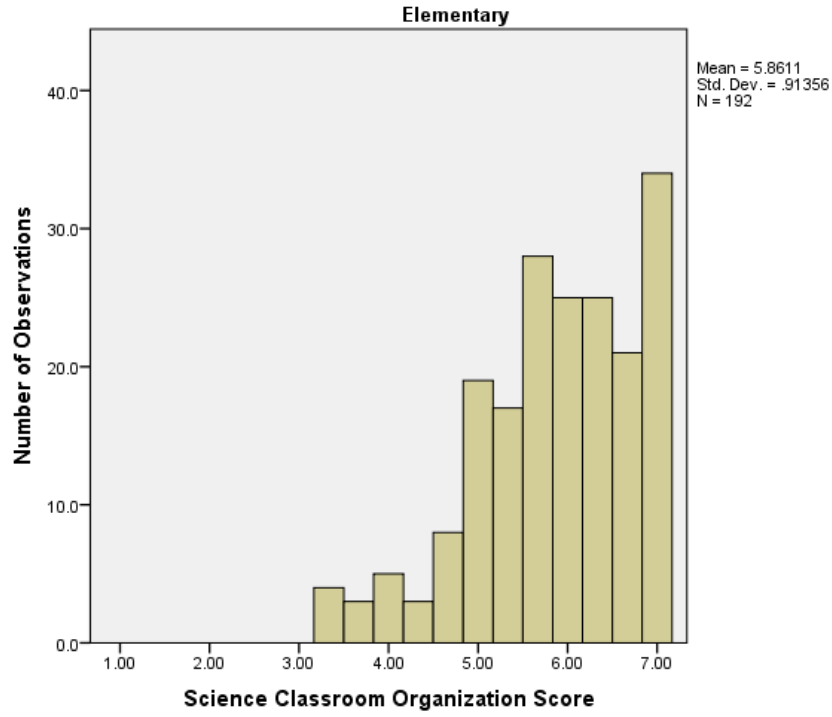


Figure 19: Middle School CLASS Score Distribution for Classroom Organization, 2012-13

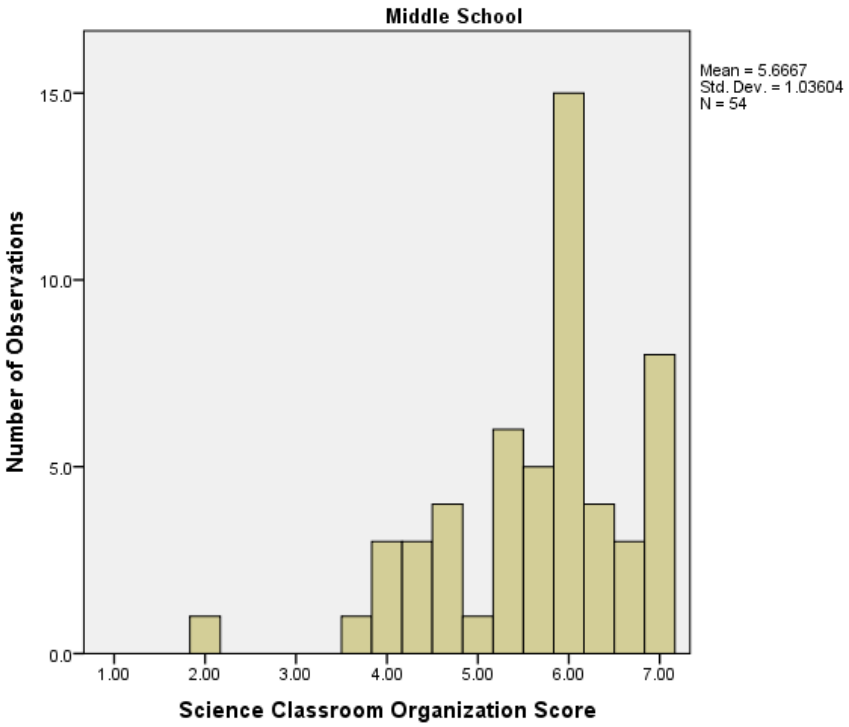
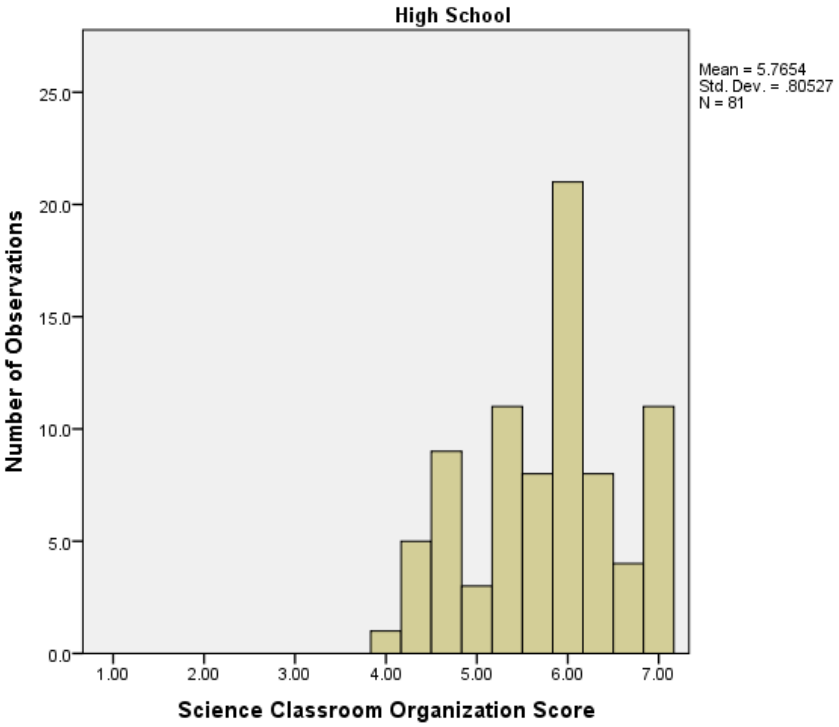


Figure 20: High School CLASS Score Distribution for Classroom Organization, 2012-13



Figures 21, 22, and 23 display score distribution within the Instructional Support domain for Science classes at the elementary, middle, and high school levels, respectively, during the 2012-13 school year.

Figure 21: Elementary School CLASS Score Distribution for Instructional Support, 2012-13

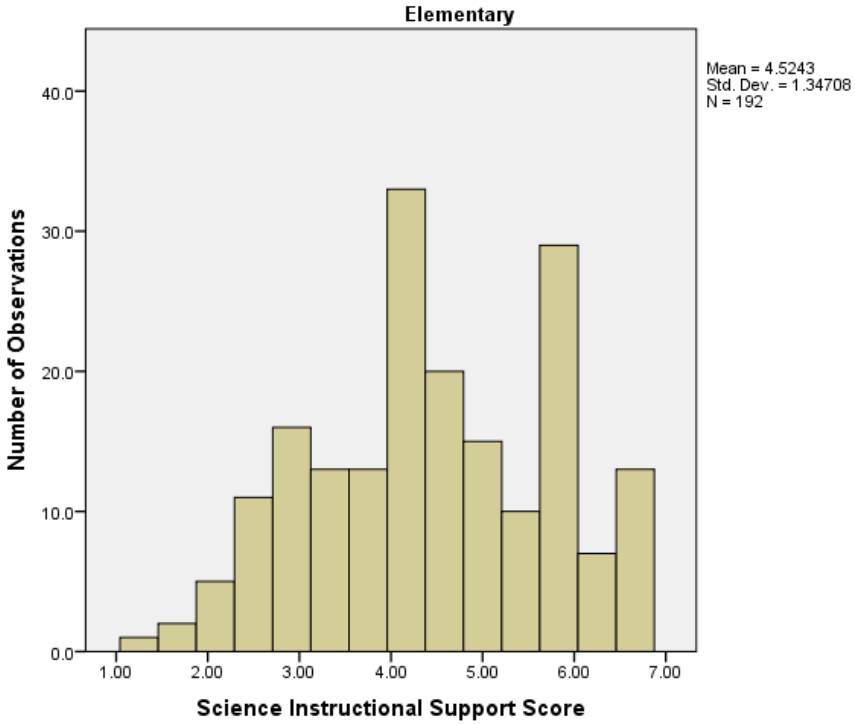


Figure 22: Middle School CLASS Score Distribution for Instructional Support, 2012-13

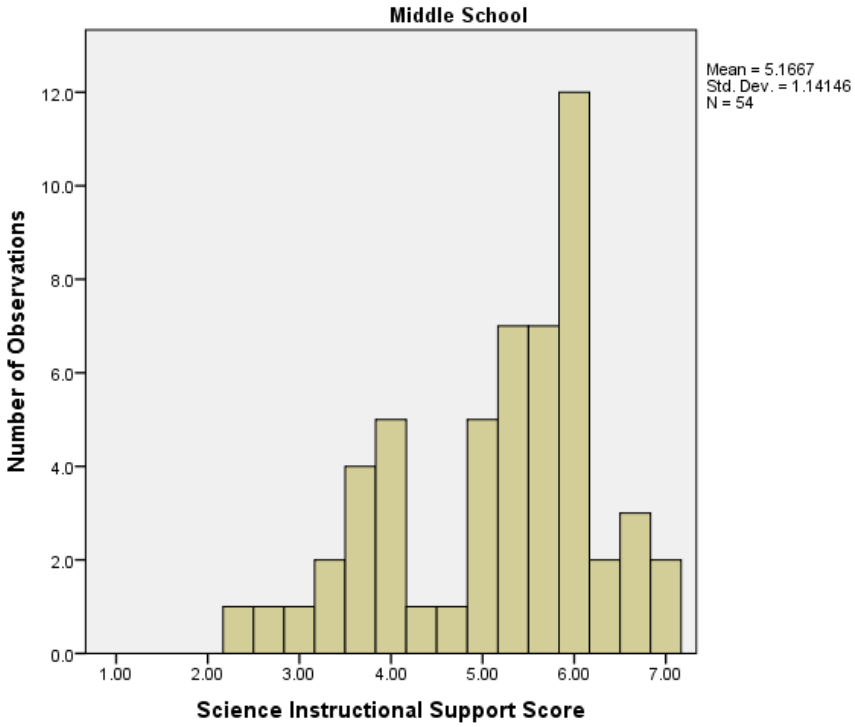
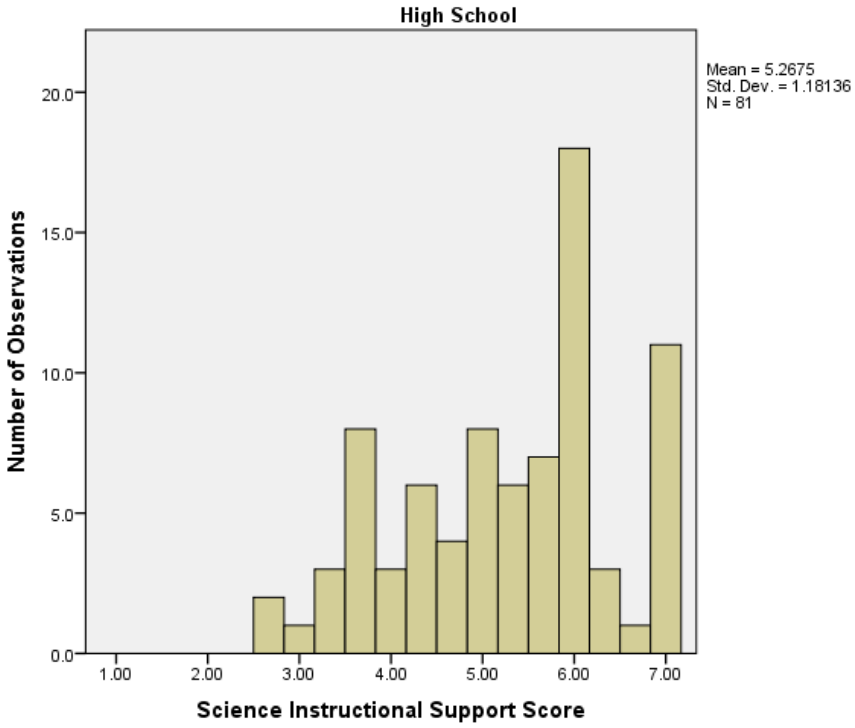


Figure 23: High School CLASS Score Distribution for Instructional Support, 2012-13



Figures 24, 25, and 26 display score distribution within the Student Engagement domain for Science classes at the elementary, middle, and high school levels, respectively, during the 2012-13 school year.

Figure 24: Elementary School CLASS Score Distribution for Student Engagement, 2012-13

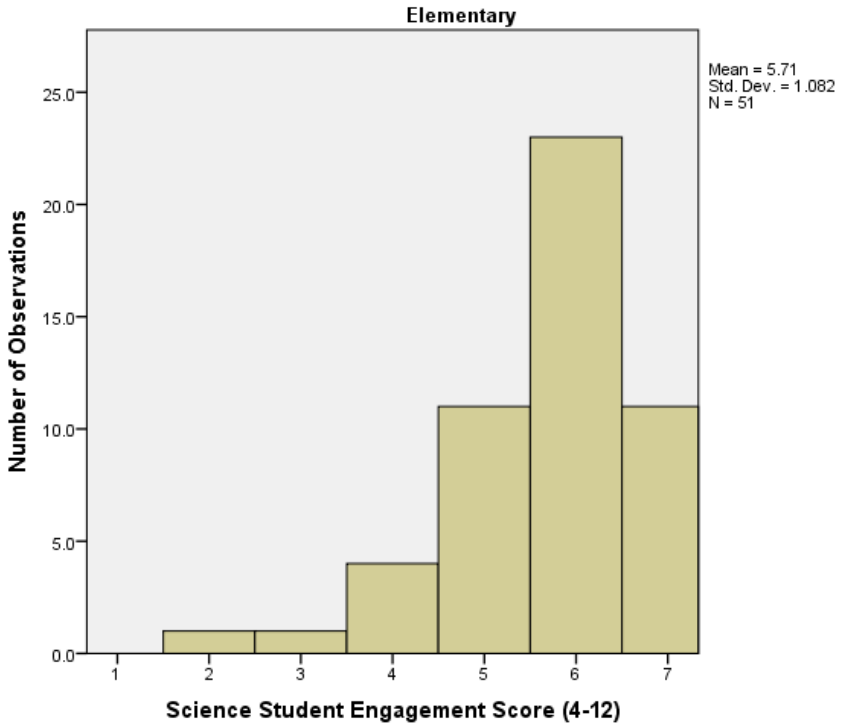


Figure 25: Middle School CLASS Score Distribution for Student Engagement, 2012-13

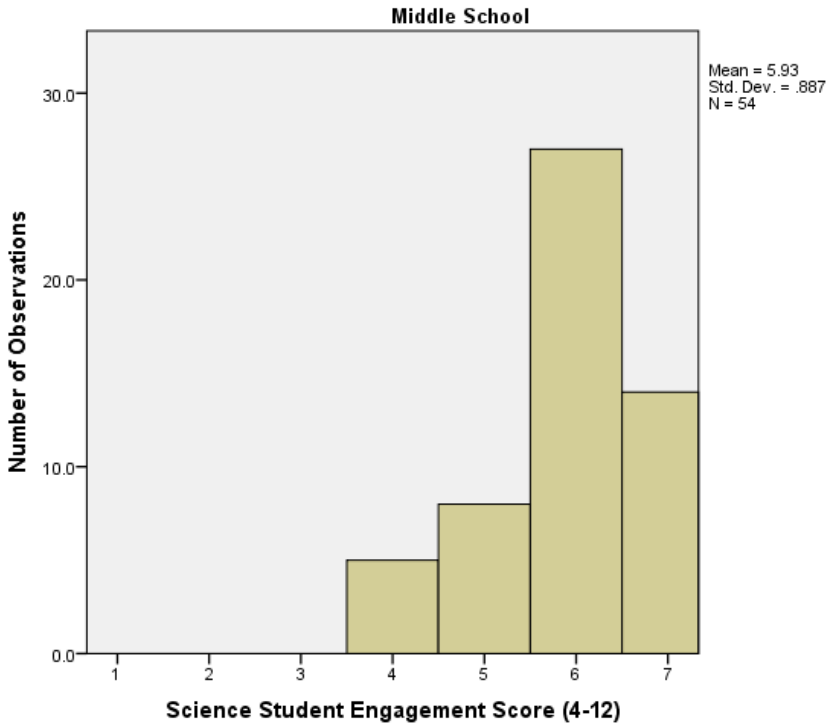
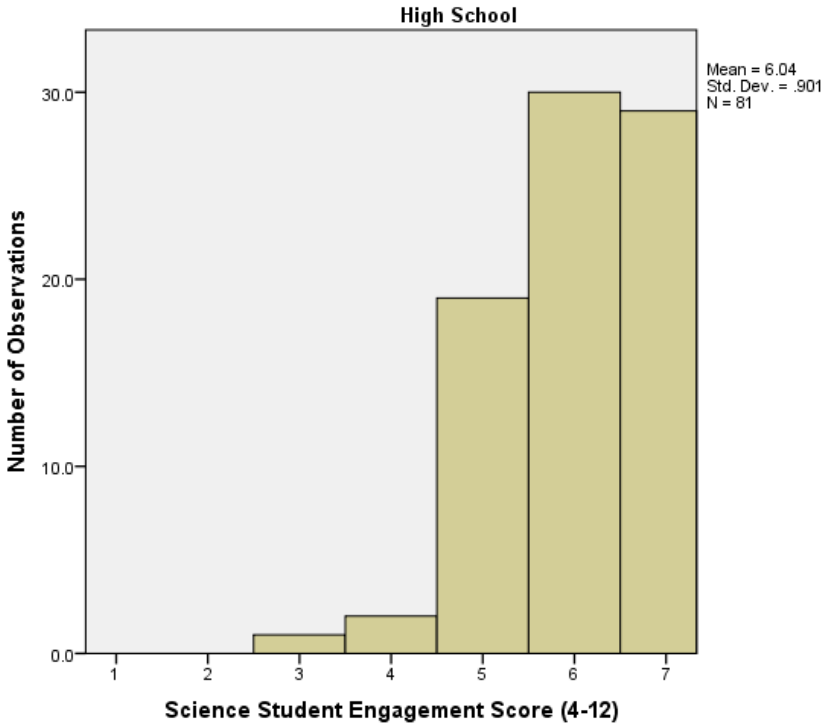


Figure 26: High School CLASS Score Distribution for Student Engagement, 2012-13



Science Observation Checklist

As part of the Science program evaluation, the Science Office created two checklists—one for elementary classes and one for secondary classes—designed to capture whether best instructional practices were being used during Science instruction. This report will discuss the process used to develop and administer the checklists, and it will summarize the results.

Checklist Background and Methodology

The APS checklists complement the CLASS (Classroom Assessment Scoring System) observations that are conducted as part of most APS program evaluations. While CLASS observations focus on the quality of teacher interaction and classroom process, content area observation checklists focus on how well a particular content area is being taught in APS classrooms.

The Science checklist was developed by the Science Office in conjunction with the Office of Planning and Evaluation. It contains 12 items related to instructional best practices.

Each item could be assigned one of the following four scores:

- **Ineffective** – The teacher's instruction and practices inadequately addresses the students' learning needs.
- **Developing/Needs Improvement** – The teacher inconsistently uses instructional strategies and practices that meet individual learning needs.
- **Effective** – The teacher engages the students' learning by using a variety of strategies and practices to meet the individual learning needs.
- **Highly Effective** – In addition to meeting the standard, the teacher optimizes students' opportunities to learn by engaging them in higher order thinking and/or enhanced performance skills.

In addition, some items had a response option of **N/A – Not Applicable**.

The Offices of Planning and Evaluation and Science trained observers during a six-hour session in which they watched video-taped science lessons and used the checklist to rate the various items being examined. They engaged in discussion around what they observed and discussed their individual checklist results together. Finally, the evaluators observed a video-taped lesson and used the checklist independently. Their results were checked for inter-rater reliability. All ten of the observers' responses were deemed reliable, and these individuals were selected to rate classrooms using the Science checklist. The observers were typically retired APS Science teachers with a wealth of instructional experience.

Altogether, 102 elementary, 48 middle, and 77 high school Science classrooms were rated with the Science checklist. Each classroom was observed only once, and each observation lasted generally 30 minutes. The classes selected reflected the range of Science instruction provided across APS and included special education, ESOL/HILT, Spanish Immersion, and accelerated classes in addition to mainstream instruction.

Data in this report is disaggregated at the elementary, middle, and high school levels and was collected in the spring of 2013. A copy of the checklist is included in table 1.

Table 1: Science Observation Checklist

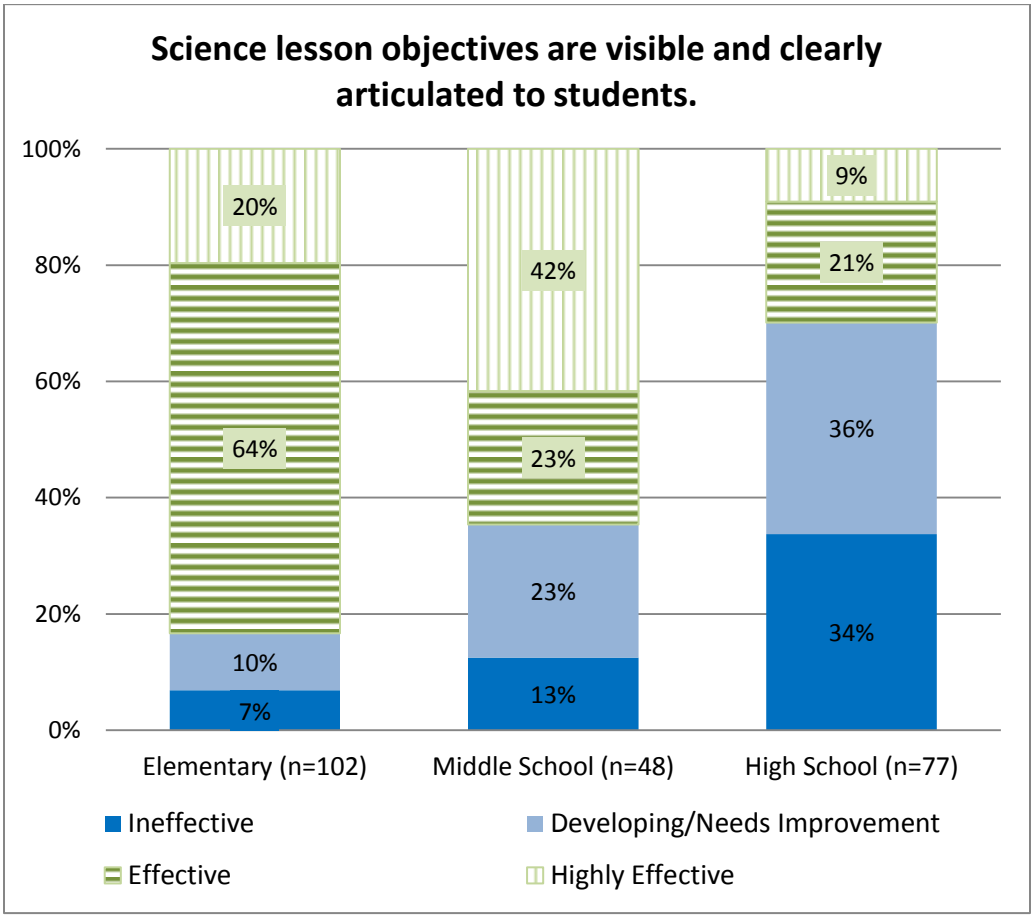
	N/A	Ineffective	Developing/ Needs Improvement	Effective	Highly Effective
Lesson Planning					
Science lesson objectives are visible and clearly articulated to students.					
Lesson aligns to stated objectives.					
Learning Environment					
Appropriate science materials are used to support instruction.					
Safe scientific investigative practices and safety equipment are used.					
Instructional Delivery					
Teacher makes connections to prior and/or future scientific concepts.					
Teacher provides opportunities for inquiry-based approach to Science instruction.					
Teacher differentiates Science instruction to meet the needs of all students.					
Teacher provides all students with equal opportunities to engage, regardless of their academic ability, race, seating location, etc.					
Teacher demonstrates scientific content knowledge.					
Students are engaged in active learning through scientific discourse.					
Students are engaged in hands-on learning/experimental lab work.					
Student Assessment					
Evidence of ongoing formative assessment to inform instruction (e.g., checks for understanding, exit tickets, journal responses, skill drills, etc.					

Checklist Results

Observers were asked to look for the use of Science objectives during lessons.

Figure 1 shows the degree to which lesson objectives were visible and clearly articulated to students at the elementary, middle, and high school levels.

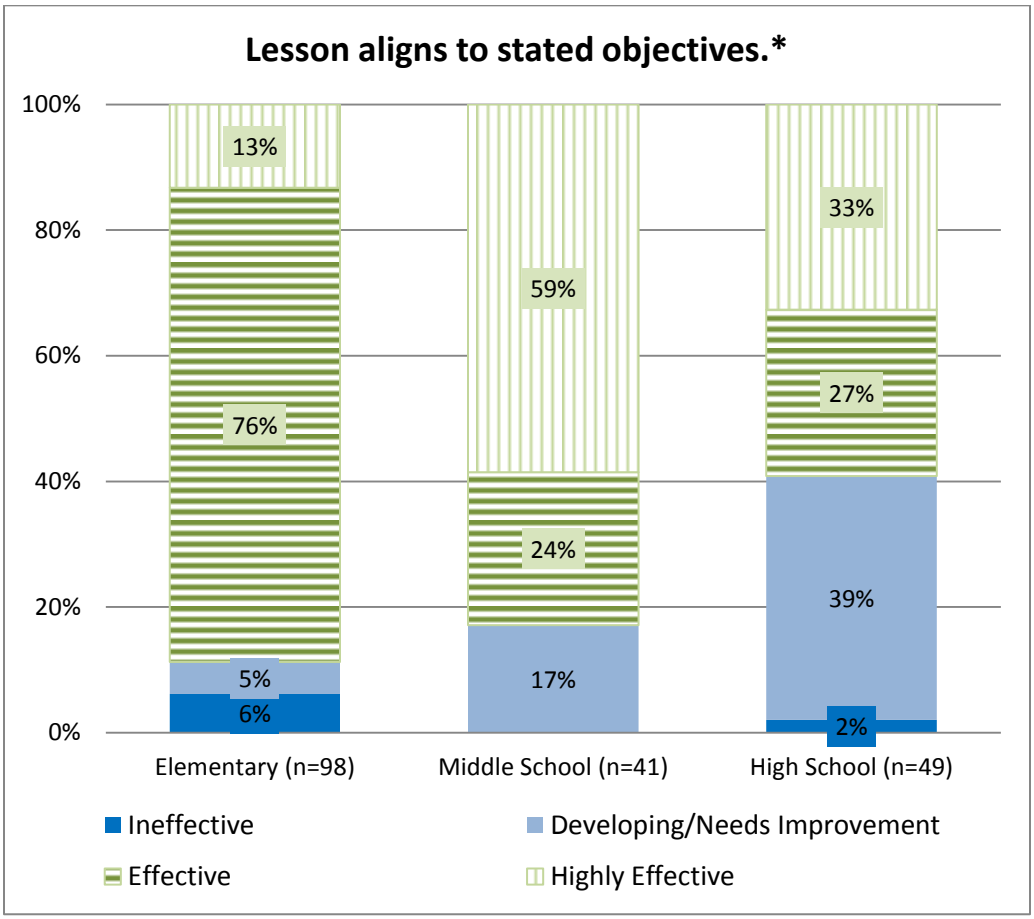
Figure 1: Visible and Clearly Articulated Science Objectives, Spring 2013



Observers were asked to look for lesson alignment to the stated Science objectives.

Figure 2 shows the degree to which Science lessons aligned to the stated Science objectives at the elementary, middle, and high school levels. No middle school classrooms were scored as "ineffective."

Figure 2: Alignment to Stated Science Objectives, Spring 2013

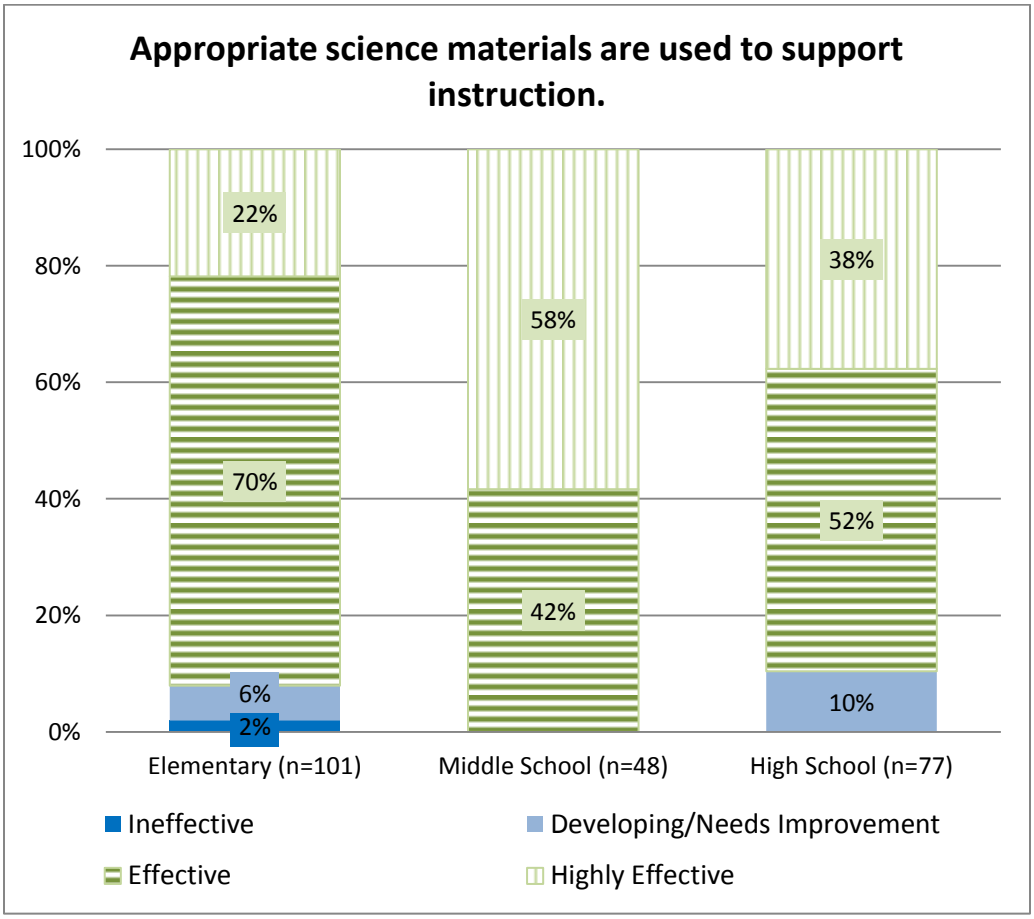


*Responses of "n/a" were removed from the total.

Observers were asked to look for the use of appropriate Science materials during lessons.

Figure 3 shows the degree to which appropriate Science materials were used to support instruction at the elementary, middle, and high school levels. No middle school classrooms were scored as "ineffective" or "developing/needs improvement." No high school classrooms were scored as "ineffective."

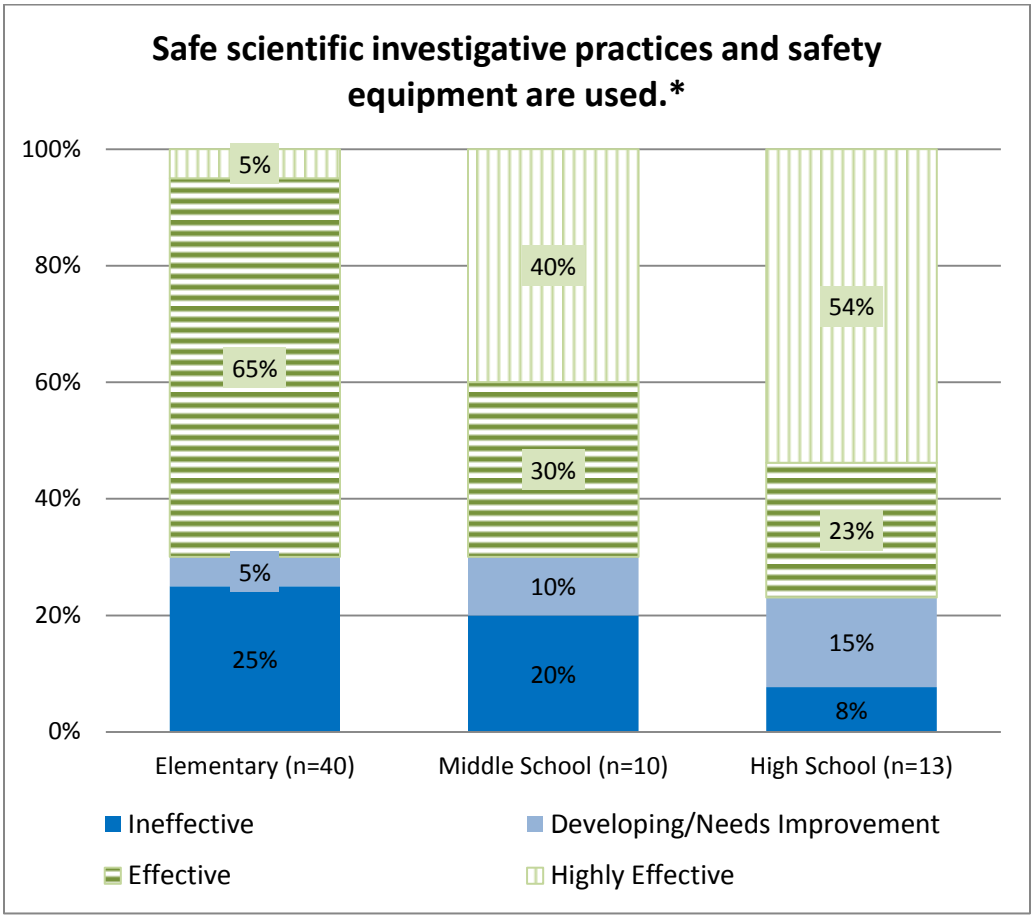
Figure 3: Appropriate Science Materials to Support Instruction, Spring 2013



Observers were asked to look for safe scientific investigative practices and the use of safety equipment during Science lessons, where appropriate.

Figure 4 shows the degree to which safe scientific investigative practices and safety equipment were used at the elementary, middle, and high school levels.

Figure 4: Safe Scientific Investigative Practices and Safety Equipment, Spring 2013

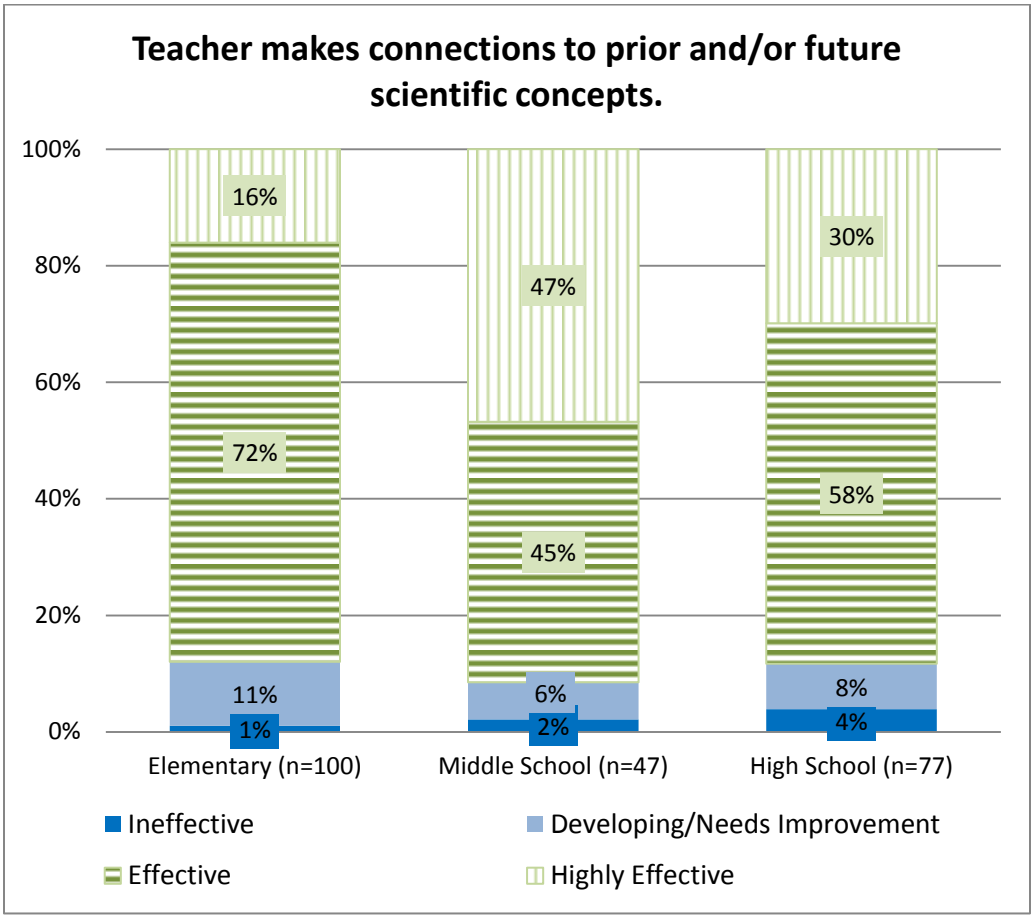


*Responses of "n/a" were removed from the total.

Observers were asked to look for evidence of teachers making connections for students during the Science lessons.

Figure 5 shows the degree to which teachers connected the Science lesson to prior and/or future scientific concepts at the elementary, middle, and high school levels.

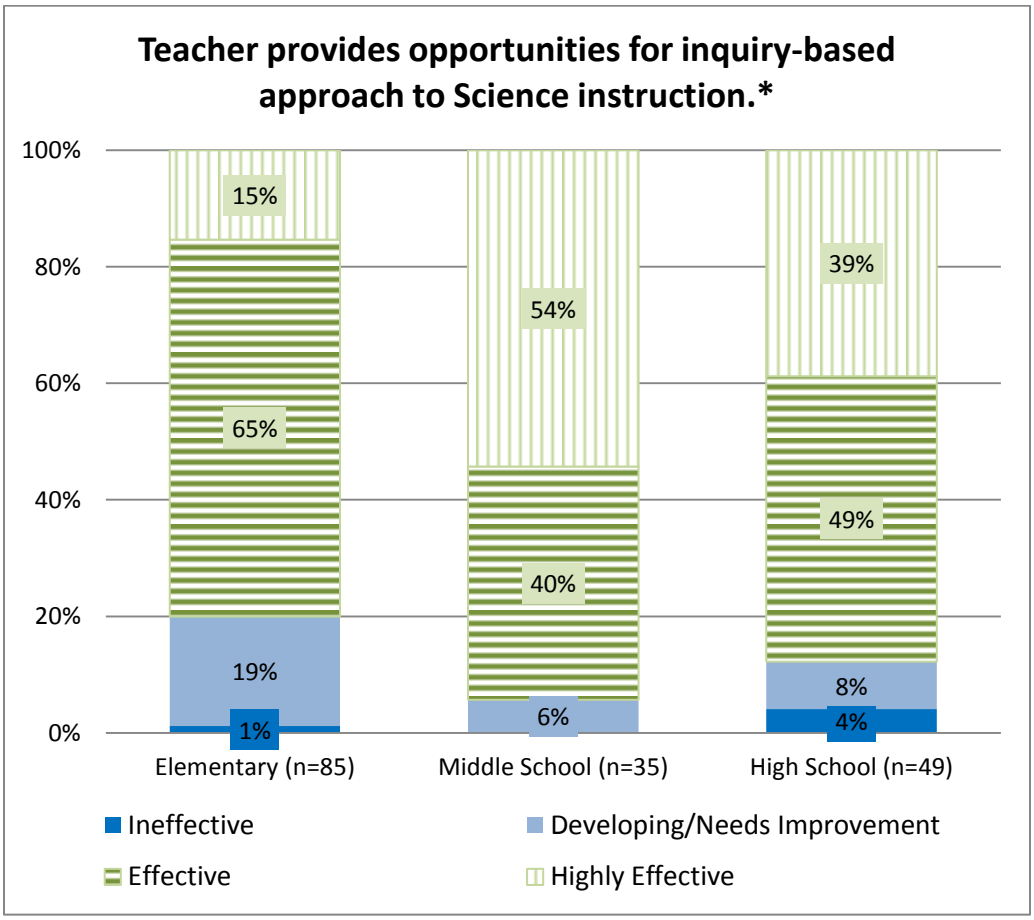
Figure 5: Connecting Science Lesson to Prior and/or Future Scientific Concepts, Spring 2013



Observers were asked to look for evidence of teachers providing students with inquiry-based opportunities.

Figure 6 shows the degree to which teachers provided opportunities for inquiry-based approaches to Science instruction at the elementary, middle, and high school. No middle school classrooms were scored as "ineffective."

Figure 6: Opportunities for Inquiry-Based Approach to Science Instruction, Spring 2013

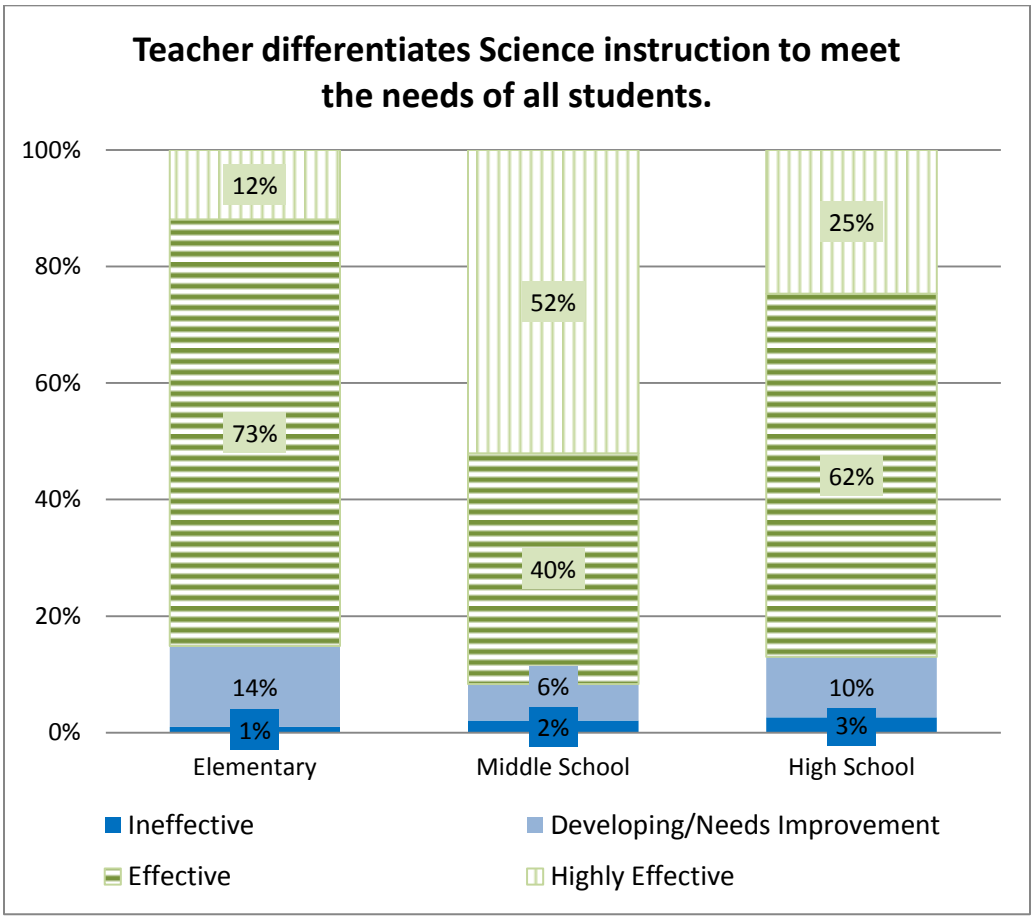


*Responses of "n/a" were removed from the total.

Observers were asked to look for evidence of teachers differentiating Science instruction.

Figure 7 shows the degree to which teachers differentiated Science instruction in an effort to meet the needs of all students at the elementary, middle, and high school levels.

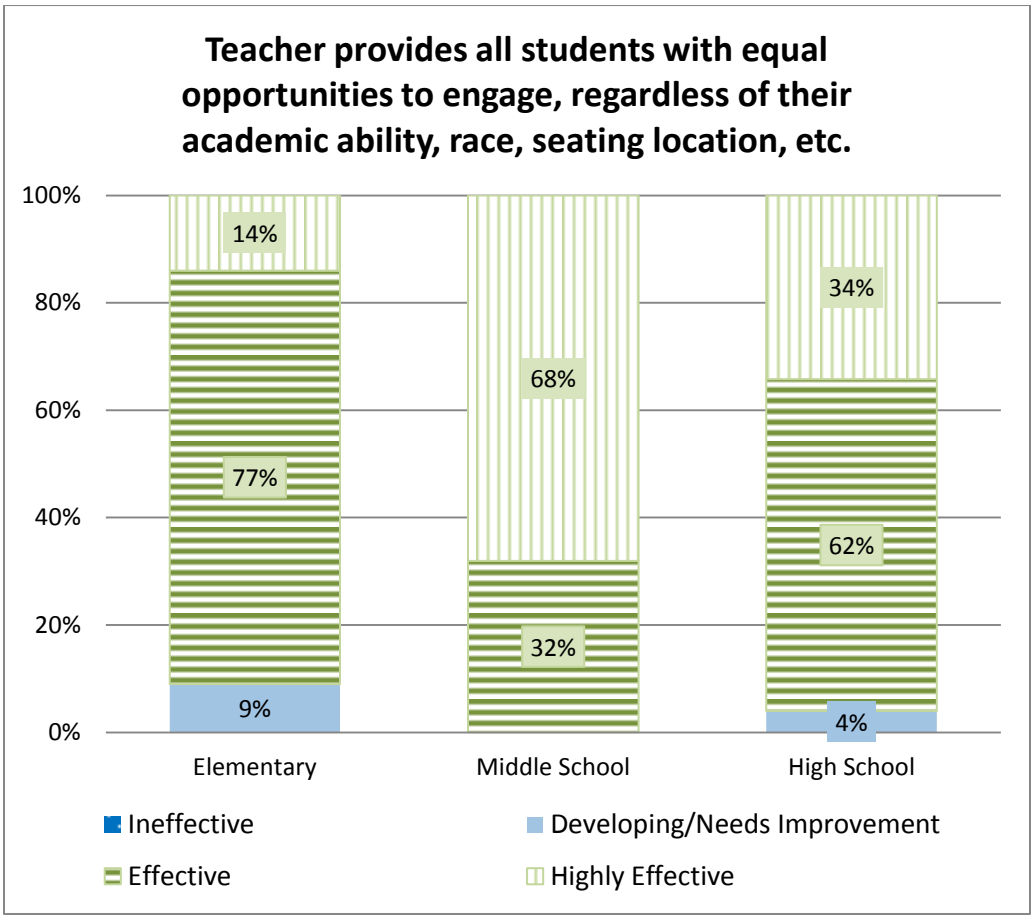
Figure 7: Differentiation of Science Instruction to Meet Student Needs, Spring 2013



Observers were asked to look for evidence of teachers providing students with equal engagement opportunities during Science instruction.

Figure 8 shows the degree to which teachers provided students with equal opportunities to engage in Science lessons at the elementary, middle, and high school levels regardless of their academic ability, race, seating location, etc. No middle school classrooms were scored as "ineffective" or "developing/needs improvement." No elementary or high school classrooms were scored as "ineffective."

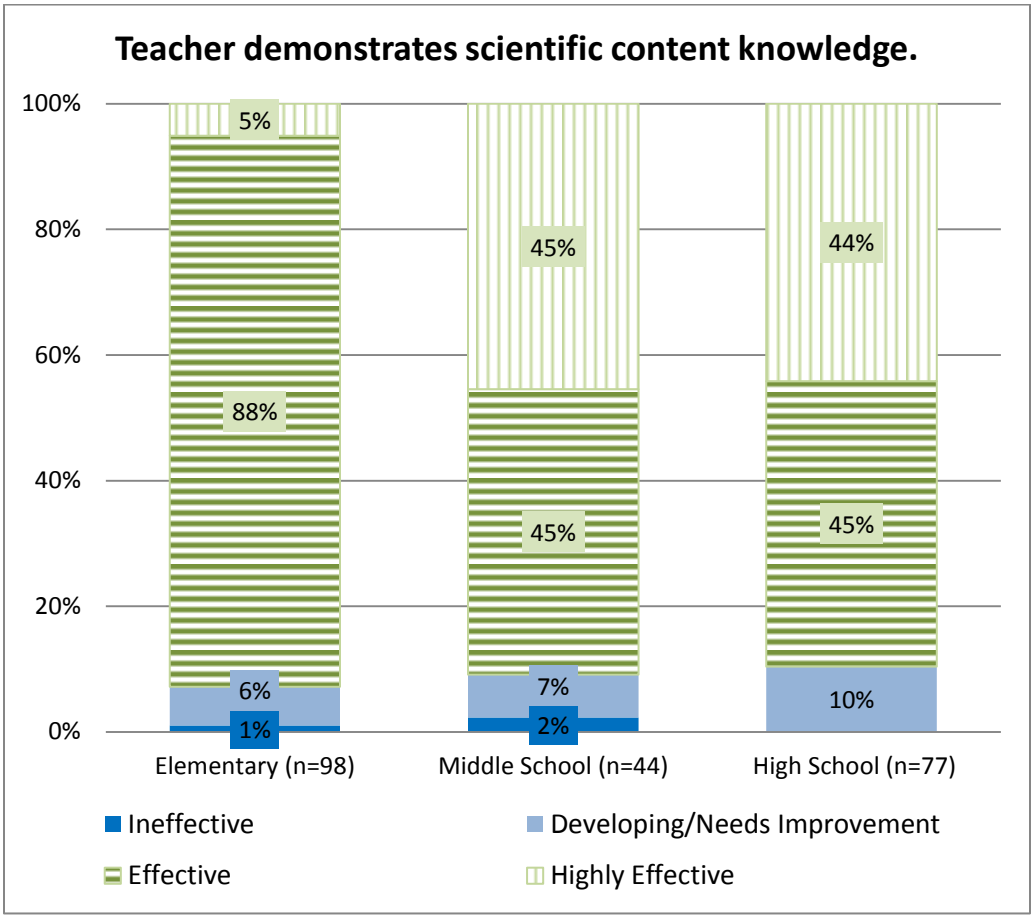
Figure 8: Equal Opportunities for All Students to Engage in Science Lessons, Spring 2013



Observers were asked to look for evidence of teachers adequately demonstrating their understanding of Science concepts.

Figure 9 shows the degree to which teachers demonstrated their scientific content knowledge at the elementary, middle, and high school levels. No high school classrooms were scored as "ineffective."

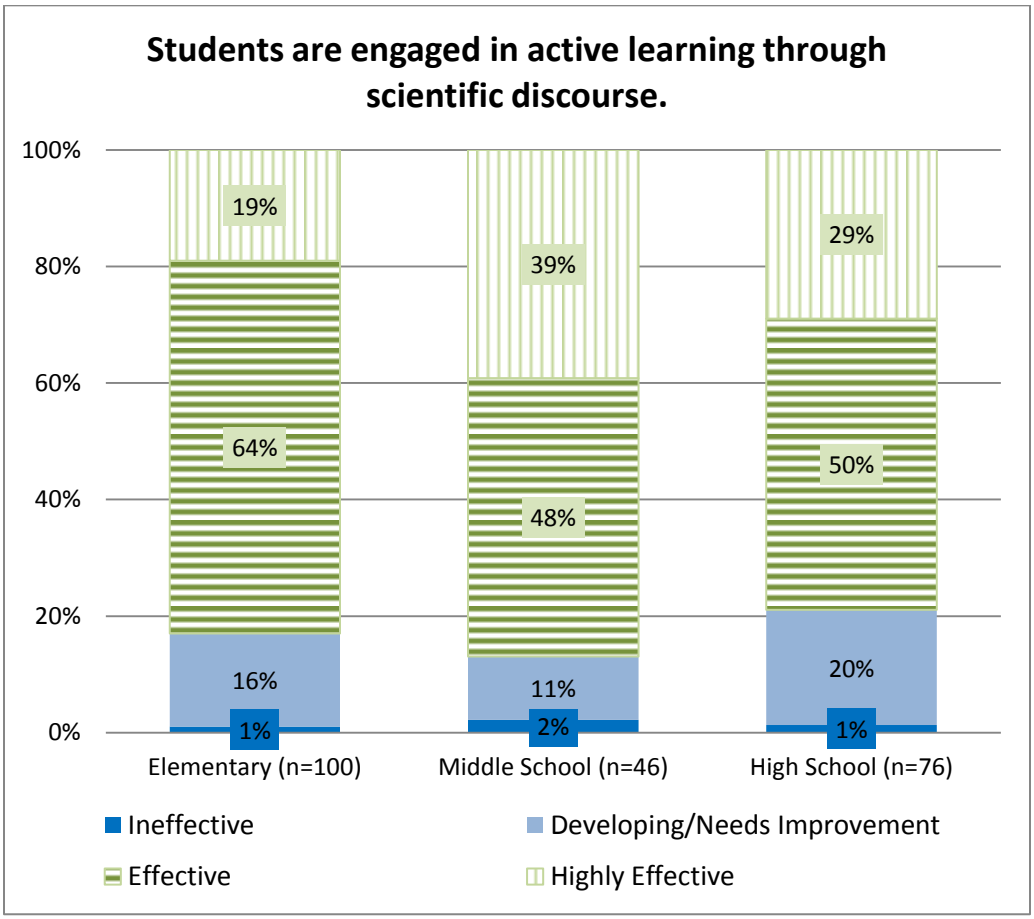
Figure 9: Teacher Demonstration of Scientific Content Knowledge, Spring 2013



Observers were asked to look for evidence of student engagement in scientific discussions.

Figure 10 shows the degree to which students were engaged in active learning through scientific discourse at the elementary, middle, and high school levels.

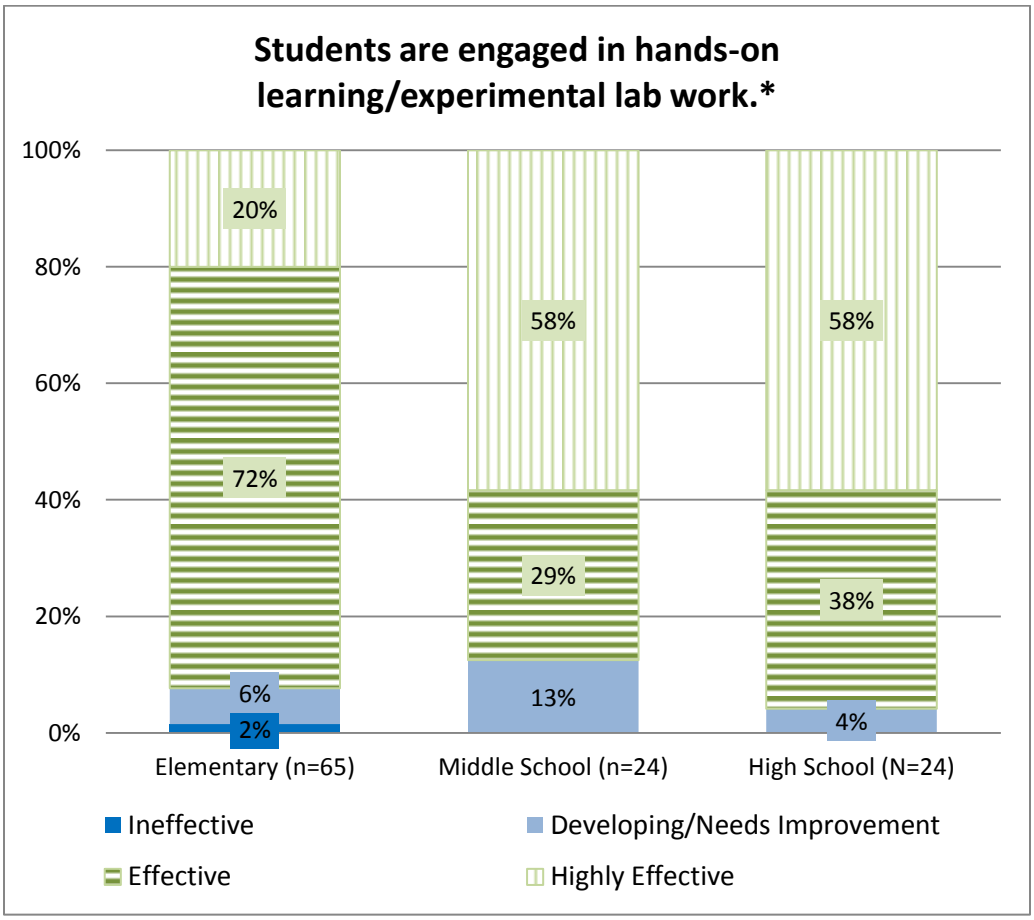
Figure 10: Student Engagement in Scientific Discourse, Spring 2013



Observers were asked to look for evidence of hands-on learning and/or experimental lab work, where appropriate.

Figure 11 shows the degree to which students were actively engaged in hands-on learning or experimental lab work at the elementary, middle, and high school levels. No middle or high school classrooms were scored as "ineffective."

Figure 11: Student Engagement in Hands-On Learning/Experimental Lab Work, Spring 2013

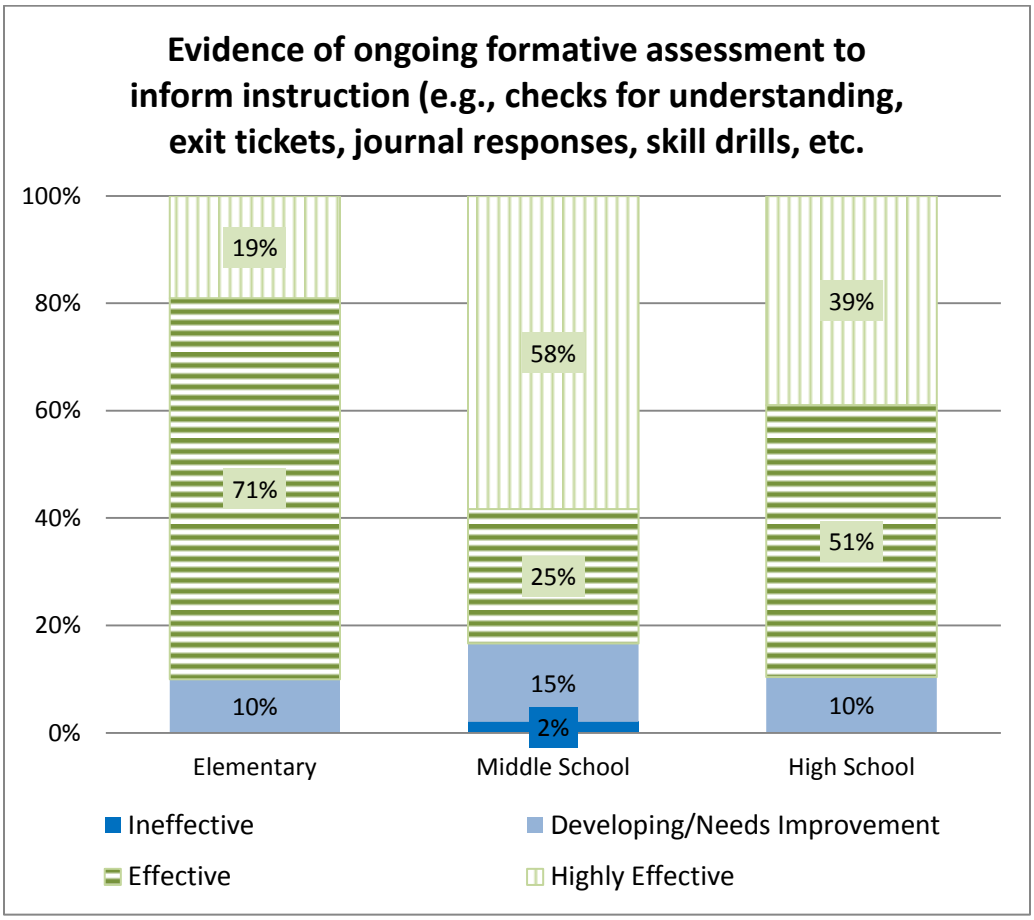


*Responses of "n/a" were removed from the total.

Observers were asked to look for evidence of ongoing assessment to inform instruction.

Figure 12 shows the degree to which there was evidence of ongoing formative assessment to inform instruction at the elementary, middle, and high school levels. Examples of ongoing formative assessment include, but are not limited to, checks for understanding, exit tickets, journal responses, and skill drills. No elementary or high school classrooms were scored as "ineffective."

Figure 12: Evidence of Ongoing Formative Assessment to Inform Instruction, Spring 2013



One of the key questions to be answered by this evaluation was whether Science instruction was occurring at regularly scheduled times. At the secondary level, it was logical to assume that students attended Science classes as scheduled. But at the elementary level, schedules are often left to the discretion of teachers and administrators. Also, elementary schools often split instruction time for Science and Social Studies throughout the school year.

Forty-one percent of the elementary classrooms observed did not teach Science during the scheduled observation time. The primary reason for this, according to anecdotal feedback from observers, was that another content area was being taught instead, typically Social Studies. This is not a reflection of inaccurate schedules, since many elementary schools schedule one block for "content," which could be either Science or Social Studies.

Figure 13: Percent of Classes Observed Teaching Science during Scheduled Science Time, Spring 2013