

# Report on the 2021 Survey of Science Teachers and Supervisors

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## Executive Summary

Pursuant to House Bill 1227: Education-Core Content Areas Accountability Program, this report overviews the results of the science subsection of the 2021 Annual Social Studies and Science Teacher Survey. In total, over 4,500 teachers across Maryland responded to the survey. About 46% of respondents identified as elementary level teachers. Middle school and high school level teachers each comprised approximately 27% of respondents. The survey collected information about instructional time for science at the elementary level, availability and use of instructional materials, teachers' instructional methods, the availability and use of instructional technology, and the availability and use of professional learning in science.

At the elementary level, most teachers reported working within integrated grade level teams where they teach students in multiple subject areas including science and social studies. Only about 18% of elementary teachers reported working in schools that used departmental organizational structures where teachers specialize in particular content instruction. The science instructional time between the integrated and departmentalized structures differed. About 45% of elementary teachers working in departmentalized schools reported teaching science to students five days each week. This compared to only 25% of teachers in integrated settings. It was also noteworthy that about 79% of teachers in departmentalized settings reported teaching science between 30 and 60 minutes per day on days science is included in the schedule. Teachers in integrated model schools reported fewer minutes dedicated to science instruction. Only approximately 76% of these teachers indicated teaching science for 30 or more minutes each day that science is taught.

At all levels, teachers reported using a wide array of instructional methods. Hands-on activities were prominent at all levels, but online simulations and videos were also used commonly at the middle school and high school levels. Most teachers reported having adequate access to materials. Teachers reported that students at all levels use the Science and Engineering Practices (SEP) in learning science. Elementary and middle school students most often use the SEP of "asking questions and defining problems." High school students more frequently use the SEP of "analyzing and interpreting data." Teachers reported access to a variety of instructional technologies. Well over 90% of teachers at all levels reported they use school-issued laptops and similar devices. According to Science Supervisors, a wide array of professional learning opportunities is offered at the district level. Teachers confirm access to professional learning and reported the use of both personal and collaborative planning time as the most common professional learning activities at each level of school.

Certification data for middle school and high school science teachers across Maryland indicate that most teachers hold certification appropriate for their teaching assignment. There are instances where teachers are teaching science without being properly certified.

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## Introduction

House Bill 1227: Education-Core Content Areas Accountability Program requires the Maryland State Department of Education (MSDE) to conduct a survey of public schools and public school teachers annually to measure the amount of instructional time spent on social studies and science instruction in elementary school; the availability and use of appropriate instructional resources and teaching technology in social studies and science classrooms; the availability and use of appropriate professional development for social studies and science teachers; and the number of secondary school social studies and science classes that are taught by teachers who are certified and not certified in the subject being taught.

Annually since 2012, elementary, middle, and high school teachers of science and social studies have been invited to respond to these surveys. Traditionally, separate surveys for science and social studies were designed and promulgated. Whereas middle school and high school teachers generally teach *either* social studies or science, elementary teachers frequently teach both subjects. This meant that in the past, elementary teachers often confronted requests to complete two separate surveys. To reduce burden, the MSDE Office of Social Studies and Office of Science collaborated to produce a single survey in 2021. The survey was administered via Survey Monkey between October 4 and November 5, 2021 and was designed to route respondents only to questions relevant to the individuals' current teaching assignment. This revised format meant that elementary teachers received a request to complete only a single survey; middle and high school teachers saw no change to their requests.

An annual survey has also been distributed to content area supervisors in Social Studies and Science since 2012. The supervisor survey has traditionally asked supervisors to report information on professional learning and certification of teachers. In a further effort to reduce burden on school system personnel, the MSDE Office of Social Studies and Office of Science redesigned the annual Social Studies and Science Supervisor survey to eliminate the requirement for supervisors to compile teachers' certification information. As an alternative in 2021, the MSDE Office of Social Studies and Office of Science partnered with the MSDE Office of Accountability to compile and report information on teacher certification.

As shown in Figure 1 and the corresponding Table 1, there were 4,512 total responses to the teacher survey. Respondents represented each of the 24 LEA in the state. There were 2,077 responses from elementary teachers; 1,207 responses from middle school teachers; and 1,228 responses from high school teachers in total. Of these respondents, 1,493 elementary teachers responded to the survey questions specific to science; 718 middle school teachers reported themselves as teachers of science; and 727 of the respondents identified themselves as teaching high school science. Survey respondents were permitted to skip questions within the survey. Thus, the number of responses to questions varies.

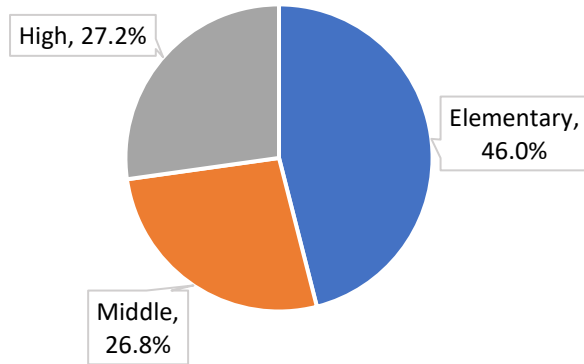
The Science Supervisor survey also collected information from each of the 24 LEAs. There were 32 responses to the Science Supervisor survey which reflects varying organizations within LEAs. Some supervisors oversee K-12 programming; others may hold responsibility for particular grade bands. In the latter case, two responses from the school system were included in the final analysis.

Data on science teacher certification at the middle school and high school levels are presented.



**Figure 1**

*Percentage of Survey Respondents at Each School Level*



**Table 1**

*Percentage of Survey Respondents at Each School Level*

Level of School	Responses	
Elementary	46.0%	2,077
Middle	26.8%	1,207
High	27.2%	1,228
	<b>Answered</b>	<b>4,512</b>

This report presents the survey results related to the legislatively mandated areas of focus: instructional time for science in elementary schools; availability and use of appropriate instructional materials; availability and use of instructional technology; the availability and use of professional learning; and teacher certification in science.

## Instructional Time Elementary

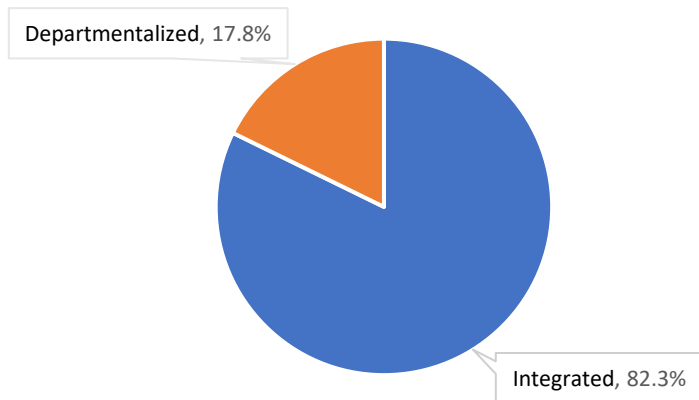
Adequate instructional time for science is critical to student success. In order to understand the amount of time dedicated to science instruction at the elementary level, the survey asked teachers a series of questions about their teaching contexts, the average number of days each week that included science instruction, and the average number of minutes dedicated to science instruction on those days. This section begins with an explanation about different instructional models used in elementary schools so that instructional time can be analyzed with respect to these different organizational structures. The section concludes with a comparison of reported instructional time at the elementary level between the 2020 and 2021 surveys.

## Instructional Models in Elementary Schools

The 2021 survey asked all elementary level respondents to indicate the instructional model employed in their current teaching assignment. For the purposes of the survey, the models included either an integrated instructional model or a departmentalized instructional model. The integrated instructional model was defined as one where the teacher provides instruction in multiple academic areas including both science and social studies. A departmentalized model was defined as one where the teacher specializes in teaching either social studies or science; other teachers then teach the other subjects. Figure 2 and the corresponding Table 2 show that a majority (82.3%) of elementary teachers teach within the integrated instructional model.

**Figure 2**

*Instructional Models used in Elementary Schools*



**Table 2**

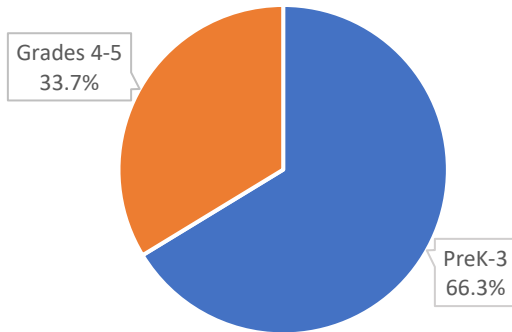
*Instructional Models used in Elementary Schools*

Instructional Model	Responses	
Integrated	82.3%	1576
Departmentalized	17.8%	340
	<b>Answered</b>	<b>1916</b>

The survey asked teachers to indicate the grade band in which they teach. The grade bands were either pre-kindergarten to grade 3 (PreK-3) or grades 4 to 5 (Grades 4-5). Figure 3 and the corresponding Table 3 show the grade band distribution of elementary teacher respondents who indicated they teach science in either an integrated or departmentalized context.

**Figure 3**

*Grade Band Distribution for Elementary Teacher Respondents Who Teach Science*



**Table 3**

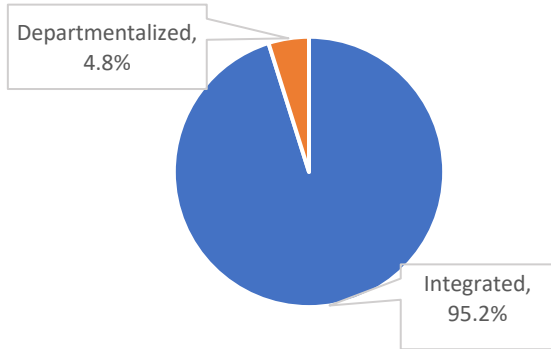
*Grade Band Distribution for Elementary Teacher Respondents Who Teach Science*

<b>Grade Band</b>	<b>Responses</b>	
<b>PreK-3</b>	66.30%	990
<b>Grades 4-5</b>	33.70%	503
	<b>Answered</b>	<b>1493</b>

Figure 4 and Figure 5, and the corresponding Table 4 and Table 5, show the relationship between grade band teaching assignment and instructional model. At the primary grade band, most teachers (95.2%) teach in classrooms that use the integrated model. At the upper elementary level, more teachers work in departmentalized settings (21.1%), but most teachers still teach in classrooms that use the integrated model (78.9%).

**Figure 4**

*Instructional Model Distribution Among Teachers in the Primary Grade Band (PK-3)*



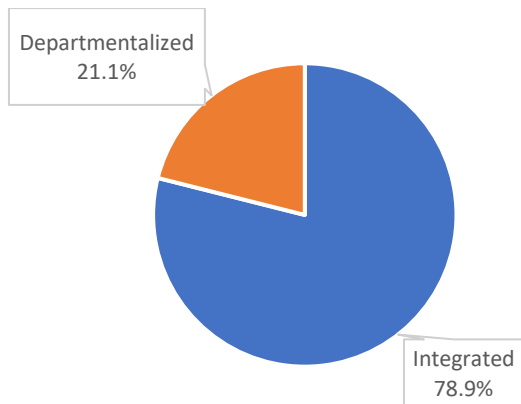
**Table 4**

*Instructional Model Distribution Among Teachers in the Primary Grade Band (PK-3)*

<b>Instructional Mode</b>	<b>Responses</b>	
<b>Integrated</b>	95.2%	942
<b>Departmentalized</b>	4.8%	48
	<b>Answered</b>	<b>990</b>

**Figure 5**

*Instructional Model Distribution Among Teachers in the Upper Elementary Grade Band (4-5)*



**Table 5**

*Instructional Model Distribution Among Teachers in the Upper Elementary Grade Band (4-5)*

<b>Instructional Model</b>	<b>Responses</b>	
<b>Integrated</b>	78.9%	397
<b>Departmentalized</b>	21.1%	106
	<b>Answered</b>	<b>503</b>

### Time Dedicated to Science

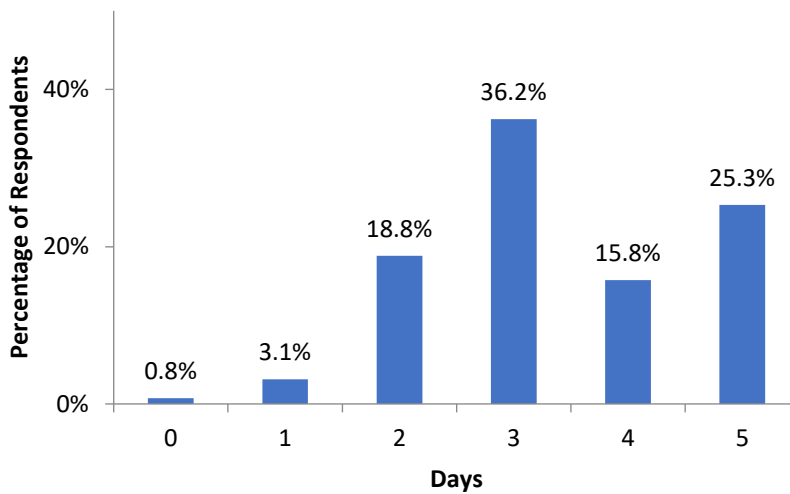
The survey asked elementary teachers to report the average number of days per week and the average amount of time per day dedicated to science teaching. The results are disaggregated into integrated and departmentalized instructional models.

#### Integrated Instructional Model

In the integrated instructional model, teachers reported varying amounts of time dedicated to science instruction in terms of both days per week and minutes per day. Figure 6 and the corresponding Table 6 show that 25.3% of teachers report teaching science every day of the week in the integrated instructional model. Over 77% report teaching science at least 3 days each week.

**Figure 6**

*Average Days per Week for Science Instruction in Elementary Classrooms –Integrated Model*



**Table 6**

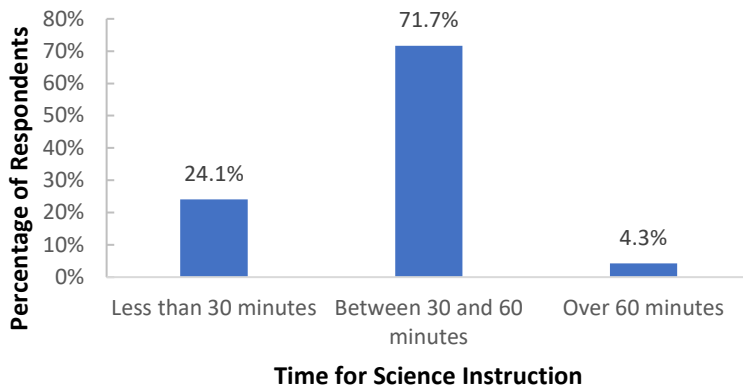
*Average Days per Week for Science Instruction in Elementary Classrooms –Integrated Model*

<b>Days of Science Instruction</b>	<b>Responses</b>	
<b>0</b>	0.8%	10
<b>1</b>	3.1%	42
<b>2</b>	18.8%	252
<b>3</b>	36.2%	485
<b>4</b>	15.8%	211
<b>5</b>	25.3%	339
	<b>Answered</b>	<b>1,339</b>

Figure 7 and the corresponding Table 7 show that a majority (71.7%) of elementary teachers in an integrated instructional model teach science between 30 and 60 minutes during each day that science is taught. Approximately 76% of teachers report teaching more than 30 minutes of science each day that science is taught. About 24% of teachers report teaching science for less than 30 minutes per day on days that science is taught.

**Figure 7**

*Time for Science Instruction Each Day Science is Taught—Integrated Model*



**Table 7**

*Time for Science Instruction Each Day Science is Taught—Integrated Model*

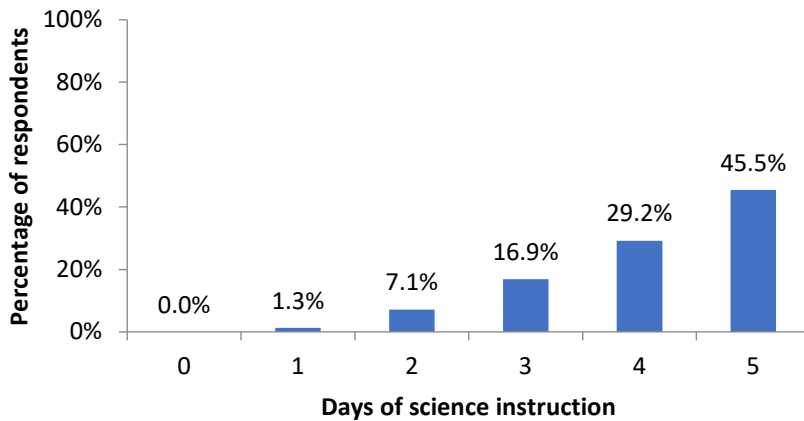
<b>Minutes of Science Instruction</b>	<b>Responses</b>	
<b>Less than 30 minutes</b>	24.1%	322
<b>Between 30 and 60 minutes</b>	71.7%	960
<b>Over 60 minutes</b>	4.3%	57
	<b>Answered</b>	<b>1,339</b>

Departmentalized Instructional Model

Figure 8 and the corresponding Table 8 show that approximately 46% of teachers in elementary schools where a departmentalized instructional model is applied teach science 5 days a week. Over 91% of teachers in the departmentalized model teach science 3 or more days per week.

**Figure 8**

*Average Days per Week for Science Instruction in Elementary Classrooms--Departmentalized*



**Table 8**

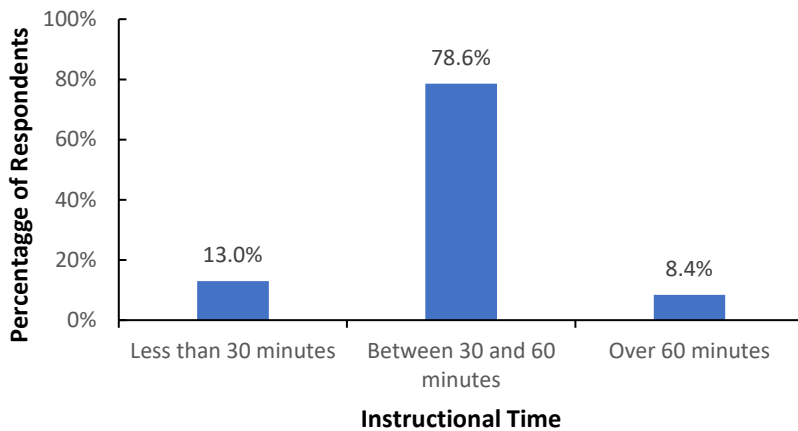
*Average Days per Week for Science Instruction in Elementary Classrooms--Departmentalized*

Days of Science Instruction	Responses	
0	0.0%	0
1	1.3%	2
2	7.1%	11
3	16.9%	26
4	29.2%	45
5	45.5%	70
	<b>Answered</b>	<b>154</b>

Figure 9 and Table 9 show that the amount of time dedicated to teaching science varies for teachers who teach in the departmentalized structure. However, most teachers (78.6%) report teaching science from between 30 and 60 minutes on those days that science is taught, and 87.0% teach science for 30 minutes or more on the days where science is taught.

**Figure 9**

*Time for Science Instruction Each Day Science is Taught—Departmentalized Model*





**Table 9***Time for Science Instruction Each Day Science is Taught—Departmentalized Model*

<b>Minutes of Science Instruction</b>	<b>Responses</b>	
<b>Less than 30 minutes</b>	13.0%	20
<b>Between 30 and 60 minutes</b>	78.6%	121
<b>Over 60 minutes</b>	8.4%	13
	<b>Answered</b>	<b>154</b>

### Trends in Elementary Instructional Time

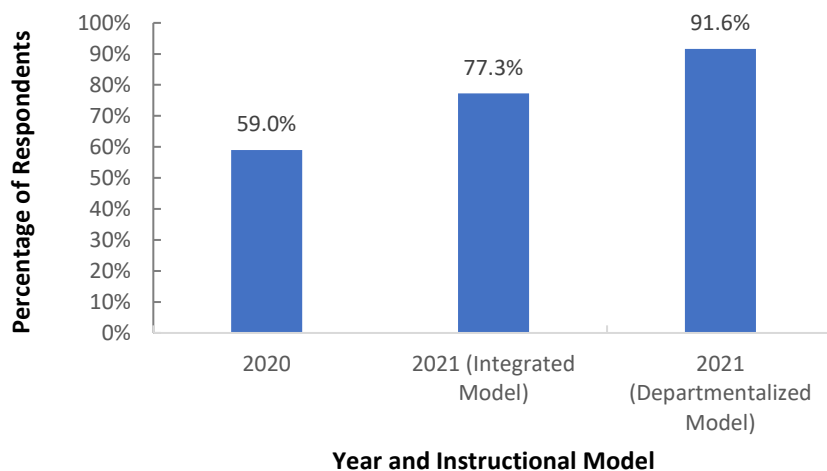
Previous surveys asked teachers about instructional time in terms of the number of days per week and the number of minutes per day for science instruction. The survey is administered near the start of the school year and does not specify whether teachers should respond according to present conditions or in retrospect. It is not unreasonable to expect responses to reflect retrospectively. That would mean that teachers’ responses to the 2021 survey may well represent instructional conditions from the 2020-21 school year when most students and teachers worked in either fully remote or hybrid learning conditions. Thus, it seems informative to compare teachers’ reports on instructional time between the 2020 and 2021 surveys.

In the 2020 survey, 932 elementary teachers (59.0% of elementary respondents) reported teaching science for 3 or more days each week on average. In this same survey, 1136 elementary teachers (71.9% of elementary respondents) reported teaching science for 30 or more minutes on the days when science instruction occurred. (Teachers did not report the instructional model in which they worked in the 2020 survey. Thus, these instructional times cannot be disaggregated further.) As noted earlier, it is not unreasonable to expect these responses to represent the instructional time allocation in elementary schools for the 2019-20 school year.

As seen in Figure 10 and its corresponding Table 10, the 2021 survey showed that teachers in both integrated and departmentalized schools reported more instructional time devoted to science. In the integrated instructional model, 1035 teachers (77.3% of elementary teachers working in integrated model schools) reported teaching science 3 or more days per week on average. One-hundred forty-one elementary teachers in departmentalized schools (91.6% of elementary teachers of science in departmentalized schools) reported teaching science 3 or more days per week on average. This amounts to 18.3% more teachers in integrated contexts and 32.6% more teachers in departmentalized contexts reporting science instruction for 3 or more days per week on average when compared to the 2020 survey.

**Figure 10**

*Teachers Reporting Science Instruction on 3 or More Days per Week in Elementary Schools in the 2020 and 2021 Surveys*



**Table 10**

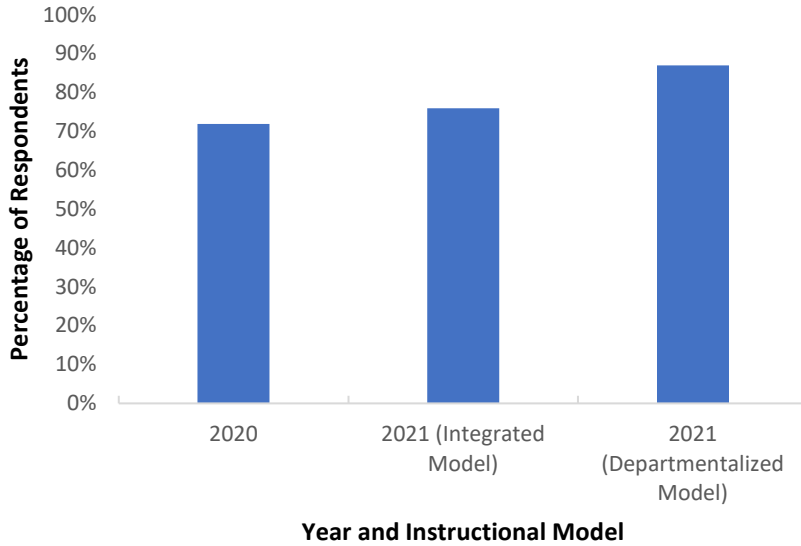
*Teachers Reporting Science Instruction on 3 or More Days per Week in Elementary Schools in the 2020 and 2021 Surveys*

Year	Instructional Model	Percent of teachers in the group	Number of teachers in the group	Percent Increase when compared to 2020 survey
2020	Unreported	59.0%	932	--
2021	Integrated	77.3%	1035	+18.3%
2021	Departmentalized	91.6%	141	+32.6%

As seen in Figure 11 and the corresponding Table 11, the 2021 survey further showed that teachers in both integrated and departmentalized schools reported more minutes of science instruction per day on the days that science was taught. Specifically, 1017 elementary teachers in schools using the integrated instructional model (76.0% of teachers in this group) reported teaching science for 30 minutes or more on days when science instruction occurred. One-hundred thirty-four elementary teachers of science in departmentalized schools (87% of elementary teachers of science in departmentalized schools) reported teaching science for at least 30 minutes on each day that science was taught. This amounts to 4.1% more teachers in integrated contexts and 15.1% more teachers in departmentalized contexts reporting science instruction of 30 minutes or longer duration on days when science instruction occurred when compared to the results of the 2020 survey.

**Figure 11**

*Teachers Reporting Science Instruction for 30 Minutes or More per Day in Elementary Schools in the 2020 and 2021 Surveys*



**Table 11**

*Teachers Reporting Science Instruction for 30 Minutes or More per Day in Elementary Schools in the 2020 and 2021 Surveys*

Year	Instructional Model	Percent of teachers in the group	Number of teachers in the group	Percent Increase when compared to 2020 survey
2020	Unreported	71.9%	1136	--
2021	Integrated	76.0%	1017	+4.1%
2021	Departmentalized	87.0%	134	+15.1%

These data suggest that both the number of days and the number of minutes dedicated to teaching science in the elementary grades increased from the 2020 survey to the 2021 survey. Though causation cannot be determined from these data alone, the data suggest that altered schedules in elementary schools during virtual and hybrid instruction may have allowed for more instruction in science.

## Instructional Methods and Materials

The following section reports information about the instructional methods and materials used in teaching science. The section is organized to report first about elementary teachers' methods of engaging students. Middle school teachers' use of instructional resources and perceived access to science equipment follows. Similar data for high school teachers are also reported. The section concludes with an overview of teachers' reporting on student engagement in the Science and Engineering Practices (SEP).

## Elementary School Level

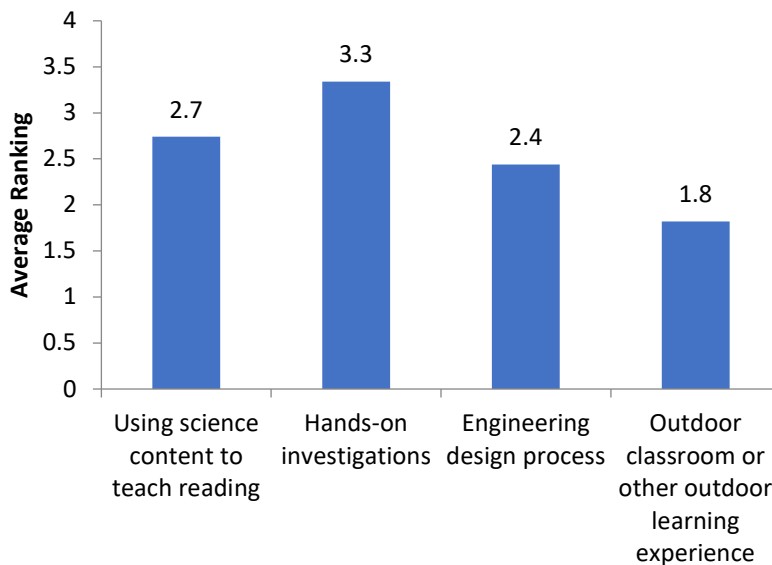
Elementary teachers, regardless of the organizational model used in their schools, apply a variety of teaching methods. The survey asked teachers to rank the relative frequency of implementation of four commonly used elementary instructional methods: using science to teach reading, hands on investigations, engineering design process, and outdoor classrooms/other outdoor learning experiences. Ranking values ranged from 1 to 4 with the value of 4 representing highest frequency of use.

## Integrated Model

Figure 12 and the corresponding Table 12 show that the most used teaching method in integrated model classrooms is hands-on investigation. It ranked as 3.34 out of 4. The use of outdoor classrooms and other outdoor learning experiences ranked as the least commonly used teaching method (1.82 out of 4).

**Figure 12**

*Instructional Methods Applied in Elementary Classrooms -- Integrated Model*



*Note: A higher magnitude ranking indicates more frequent application of the teaching method.*

**Table 12**

*Instructional Methods Applied in Elementary Classrooms -- Integrated Model*

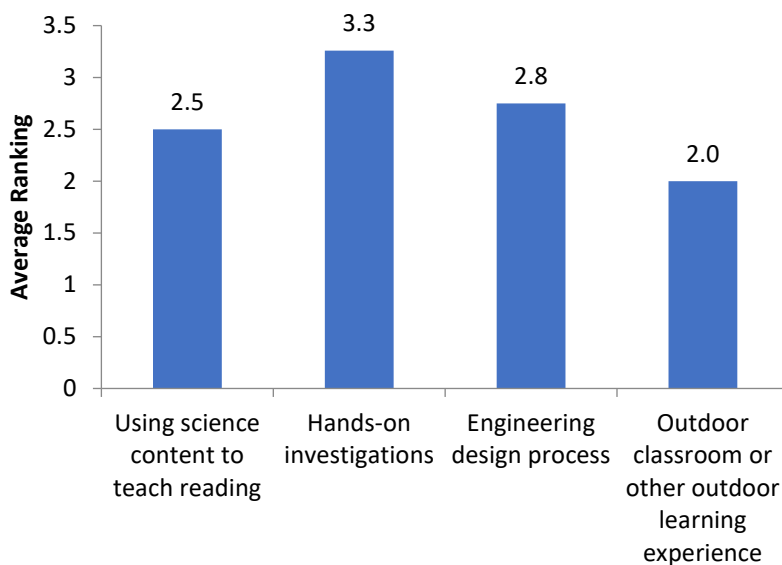
<b>Instructional Methods</b>	<b>Score</b>
<b>Using science content to teach reading</b>	2.7
<b>Hands-on investigations</b>	3.3
<b>Engineering design process</b>	2.4
<b>Outdoor classroom or other outdoor learning experience</b>	1.8
<b>Answered</b>	<b>1,339</b>

## Departmentalized Model

Figure 13 and the corresponding Table 13 show that hands on investigation is the most commonly used instructional method in elementary classrooms organized departmentally. It ranked as 3.26 out of 4. Use of outdoor classrooms and other outdoor learning experiences ranked as the least commonly used instructional method (2 out of 4).

**Figure 13**

*Instructional Methods Applied in Elementary Classrooms -- Departmentalized Model*



*Note: A higher magnitude ranking indicates more frequent application of the teaching method.*

**Table 13**

*Instructional Methods Applied in Elementary Classrooms that use a Departmentalized Instructional Model*

<b>Instructional Methods</b>	<b>Score</b>
<b>Using science content to teach reading</b>	2.5
<b>Hands-on investigations</b>	3.3
<b>Engineering design process</b>	2.8
<b>Outdoor classroom or other outdoor learning experience</b>	2.0
<b>Answered</b>	<b>154</b>

## Middle School Level

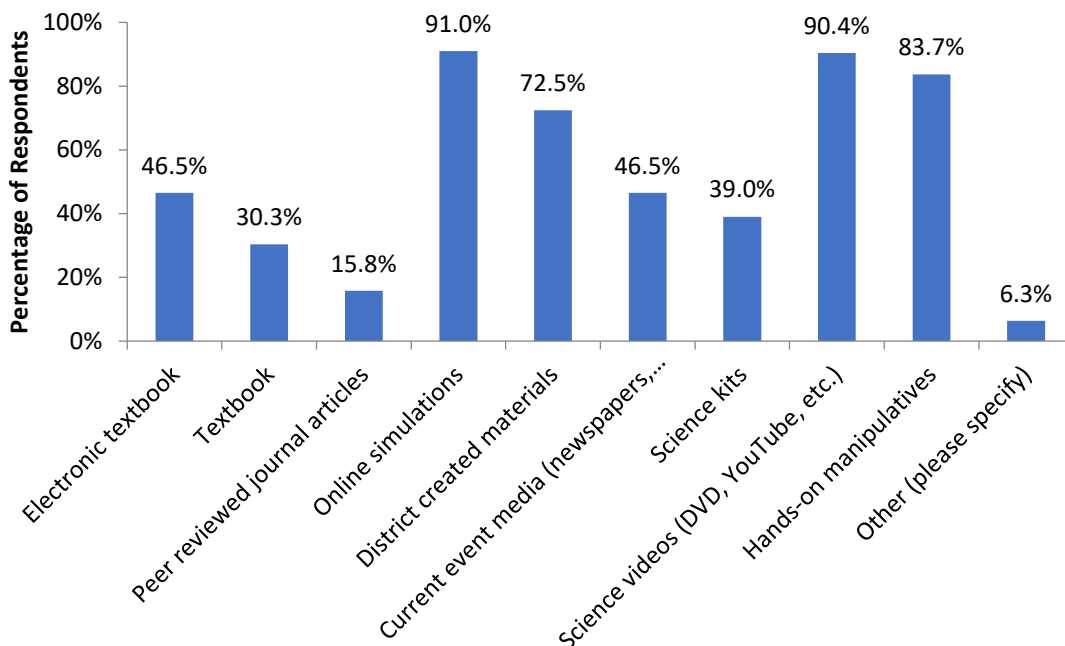
The survey asked middle school teachers to select from a list of commonly used instructional methods the methods they apply with their students. The options included: use of electronic textbooks, use of conventional textbooks, use of peer reviewed journal articles, online simulations, district created

materials, current event media, science kits, science videos, and hands on manipulatives. Teachers also had the opportunity to list other methods that did not align to the available choices.

At the middle school level, science teachers reported use of a variety of instructional methods. Figure 14 and the corresponding Table 14 show the three most common instructional methods are online simulations (91.0%), science videos (90.4%), and hands-on manipulatives (83.7%).

**Figure 14**

*Instructional Resources Used Regularly in Middle School Science Instruction*



**Table 14**

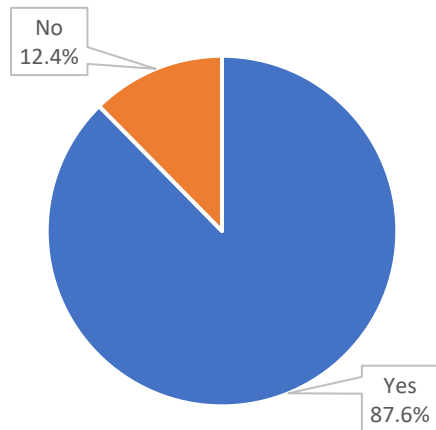
*Instructional resources used regularly in middle school science instruction*

<b>Instructional Resources</b>	<b>Responses</b>	
<b>Electronic textbook</b>	46.5%	316
<b>Textbook</b>	30.3%	206
<b>Peer reviewed journal articles</b>	15.8%	107
<b>Online simulations</b>	91.0%	618
<b>District created materials</b>	72.5%	492
<b>Current event media (newspapers, magazines)</b>	46.5%	316
<b>Science kits</b>	39.0%	265
<b>Science videos (DVD, YouTube, etc.)</b>	90.4%	614
<b>Hands-on manipulatives</b>	83.7%	568
<b>Other (please specify)</b>	6.3%	43
	<b>Answered</b>	<b>679</b>

The survey asked middle school teachers to indicate if they felt sufficient equipment, including safety equipment, was available to them. Figure 15 and the corresponding Table 15 show that approximately 88% of middle school teachers report access to sufficient equipment for teaching science.

**Figure 15**

*Middle School Science Teachers' Perceptions of Equipment Availability*



**Table 15**

*Middle School Science Teachers' Perceptions of Equipment Availability*

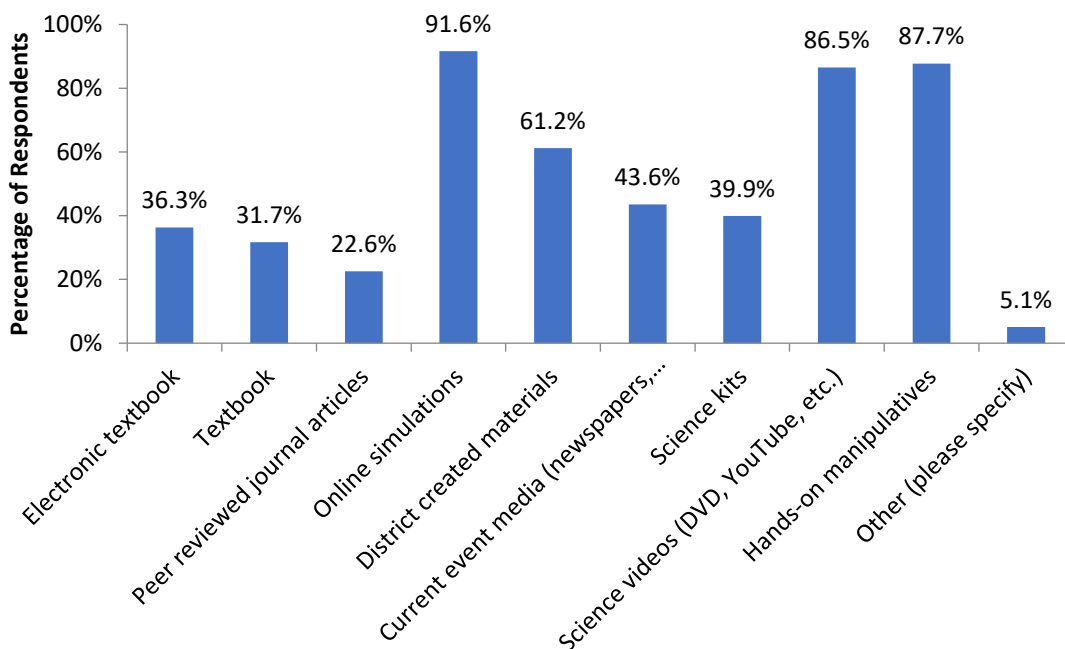
Access to Equipment	Responses	
Yes	87.6%	595
No	12.4%	84
<b>Answered</b>		<b>679</b>

### High School Level

The survey asked high school teachers to indicate the instructional resources they used with their students. The options included several resources commonly used at the secondary level such as: electronic textbooks, conventional textbooks, peer reviewed journal articles, online simulations, district created materials, current event media, science its, science videos, and hands-on manipulatives. Teachers also had opportunity to list other resources that might not align to the given options. Figure 16 and the corresponding Table 16 display information about the resources used by high school science teachers. The three most used resources are online simulations (91.6%), hands-on manipulatives (87.7%), and science videos (86.5%).

**Figure 16**

*Instructional Resources Used Regularly in High School Science Instruction*



**Table 16**

*Instructional Resources Used Regularly in High School Science Instruction*

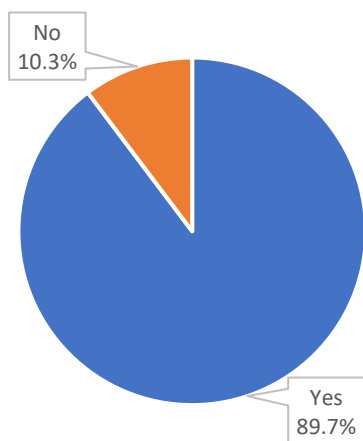
<b>Instructional Resources</b>	<b>Responses</b>	
<b>Electronic textbook</b>	36.3%	251
<b>Textbook</b>	31.7%	219
<b>Peer reviewed journal articles</b>	22.6%	156
<b>Online simulations</b>	91.6%	633
<b>District created materials</b>	61.2%	423
<b>Current event media (newspapers, magazines)</b>	43.6%	301
<b>Science kits</b>	39.9%	276
<b>Science videos (DVD, YouTube, etc.)</b>	86.5%	598
<b>Hands-on manipulatives</b>	87.7%	606
<b>Other (please specify)</b>	5.1%	35
	<b>Answered</b>	<b>691</b>



High school teachers reported if sufficient equipment, including safety equipment, was available to them. Figure 17 and the corresponding Table 17 show that most high school teachers (89.7%) report access to sufficient equipment.

**Figure 17**

*High School Science Teachers' Perceptions of Equipment Availability*



**Table 17**

*High School Science Teachers' Perceptions of Equipment Availability*

<b>Access to Equipment</b>	<b>Responses</b>	
<b>Yes</b>	89.7%	620
<b>No</b>	10.3%	71
	<b>Answered</b>	<b>691</b>

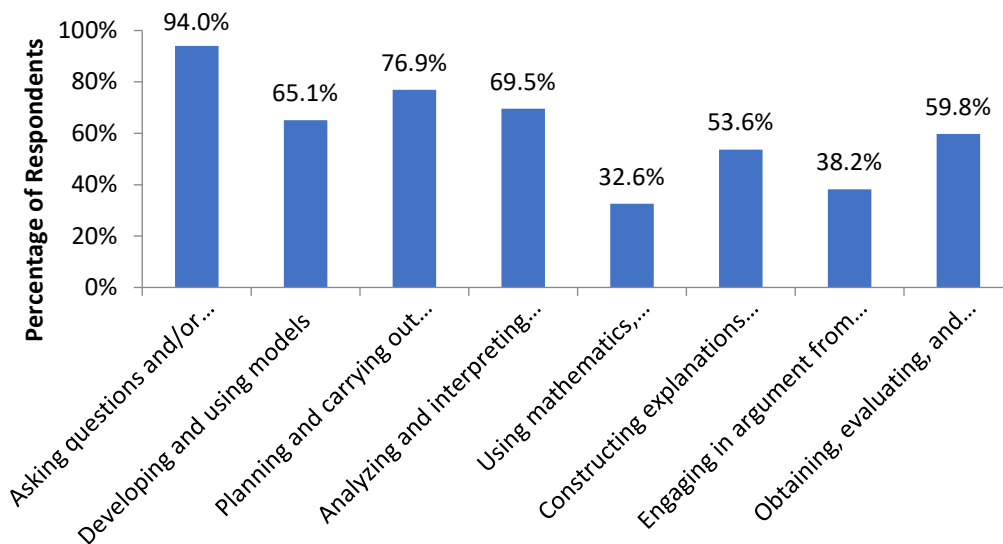
## Student Engagement in Science and Engineering Practices

### Elementary Level Integrated Classrooms

Elementary teachers reported on the engagement of their students in the Science and Engineering Practices (SEPs). Figure 18 and its corresponding Table 18 show the responses from teachers who teach science in an integrated model. Teachers reported engaging students in each of the SEPs, but the most reported SEP is that of asking questions and/or defining problems (94.0%).

**Figure 18**

*Elementary Teachers' Report of Student Engagement in SEP--Integrated*



**Table 18**

*Elementary Teachers' Report of Student Engagement in SEP--Integrated*

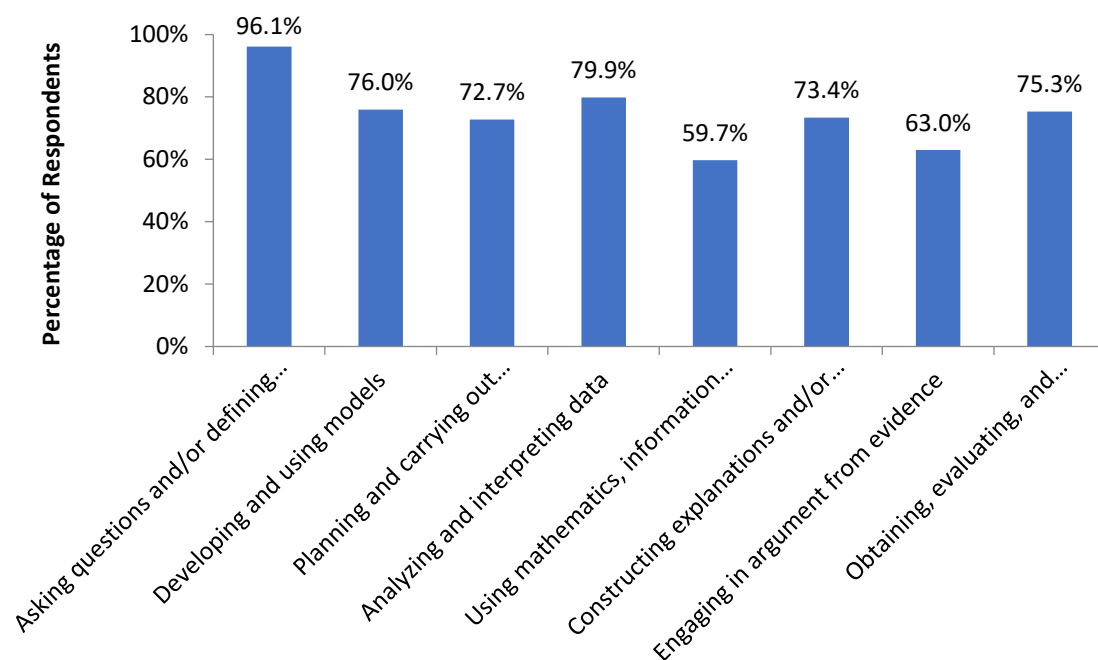
Science and Engineering Practices	Responses	
Asking questions and/or defining problems	94.0%	1,259
Developing and using models	65.1%	871
Planning and carrying out investigations	76.9%	1,030
Analyzing and interpreting data	69.5%	931
Using mathematics, information and computer technology, and computational thinking	32.6%	436
Constructing explanations and/or designing solutions	53.6%	718
Engaging in argument from evidence	38.2%	512
Obtaining, evaluating, and communicating information	59.8%	800
	<b>Answered</b>	<b>1,339</b>

Elementary Level Departmentalized Classrooms

Figure 19 and the corresponding Table 19 show the responses from teachers who teach students in a departmentalized instructional model. As with the integrated model, teachers engage students in each of the SEPs, and the most reported SEP is that of asking questions and/or defining problems (96.0%).

**Figure 19**

*Elementary Teachers' Report of Student Engagement in SEP--Departmentalized*



**Table 19**

*Elementary Teachers' Report of Student Engagement in SEP--Departmentalized*

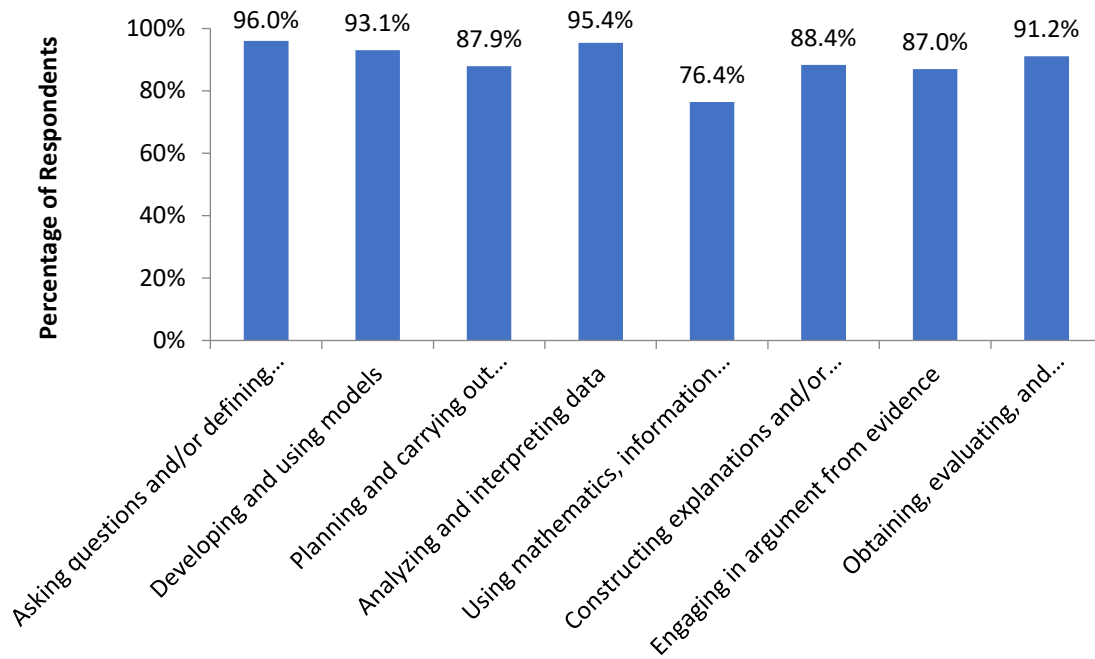
<b>Science and Engineering Practices</b>	<b>Responses</b>	
Asking questions and/or defining problems	96.1%	148
Developing and using models	76.0%	117
Planning and carrying out investigations	72.7%	112
Analyzing and interpreting data	79.9%	123
Using mathematics, information and computer technology, and computational thinking	59.7%	92
Constructing explanations and/or designing solutions	73.4%	113
Engaging in argument from evidence	63.0%	97
Obtaining, evaluating, and communicating information	75.3%	116
	<b>Answered</b>	<b>154</b>

Middle School Level

Figure 20 and its corresponding Table 20 display middle school teacher responses regarding the SEPs in which their students engage. Middle school science teachers offer students opportunities to apply each of the SEPs. Asking questions and/or defining problems (96.0%) is the most reported SEP.

**Figure 20**

*Middle School Teachers' Report of Student Engagement in SEP*



**Table 20**

*Middle School Teachers' Report of Student Engagement in SEP*

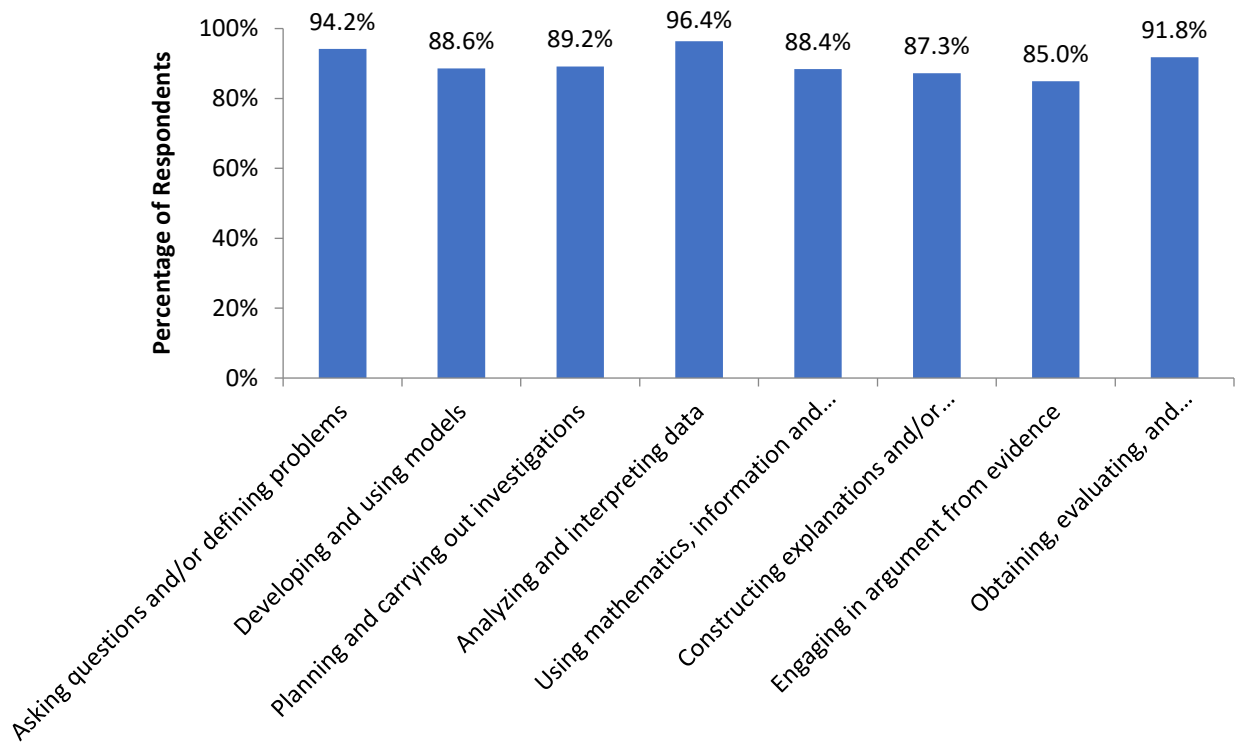
Science and Engineering Practices	Responses	
Asking questions and/or defining problems	96.0%	652
Developing and using models	93.1%	632
Planning and carrying out investigations	87.9%	597
Analyzing and interpreting data	95.4%	648
Using mathematics, information and computer technology, and computational thinking	76.4%	519
Constructing explanations and/or designing solutions	88.4%	600
Engaging in argument from evidence	87.0%	591
Obtaining, evaluating, and communicating information	91.2%	619
	<b>Answered</b>	<b>679</b>

High School Level

Figure 21 and Table 21 display high school teacher responses regarding student engagement in the SEPs. At the high school level, teachers offer students opportunities to apply each of the SEPs. The most reported SEP is that of analyzing and interpreting data (96.4%).

**Figure 21**

*High School Teachers' Report of Student Engagement in SEP*



**Table 21**

*High School Teachers' Report of Student Engagement in SEP*

<b>Science and Engineering Practices</b>	<b>Responses</b>	
Asking questions and/or defining problems	94.2%	651
Developing and using models	88.6%	612
Planning and carrying out investigations	89.2%	616
Analyzing and interpreting data	96.4%	666
Using mathematics, information and computer technology, and computational thinking	88.4%	611
Constructing explanations and/or designing solutions	87.3%	603
Engaging in argument from evidence	85.0%	587
Obtaining, evaluating, and communicating information	91.8%	634
	<b>Answered</b>	<b>691</b>

## Instructional Technology

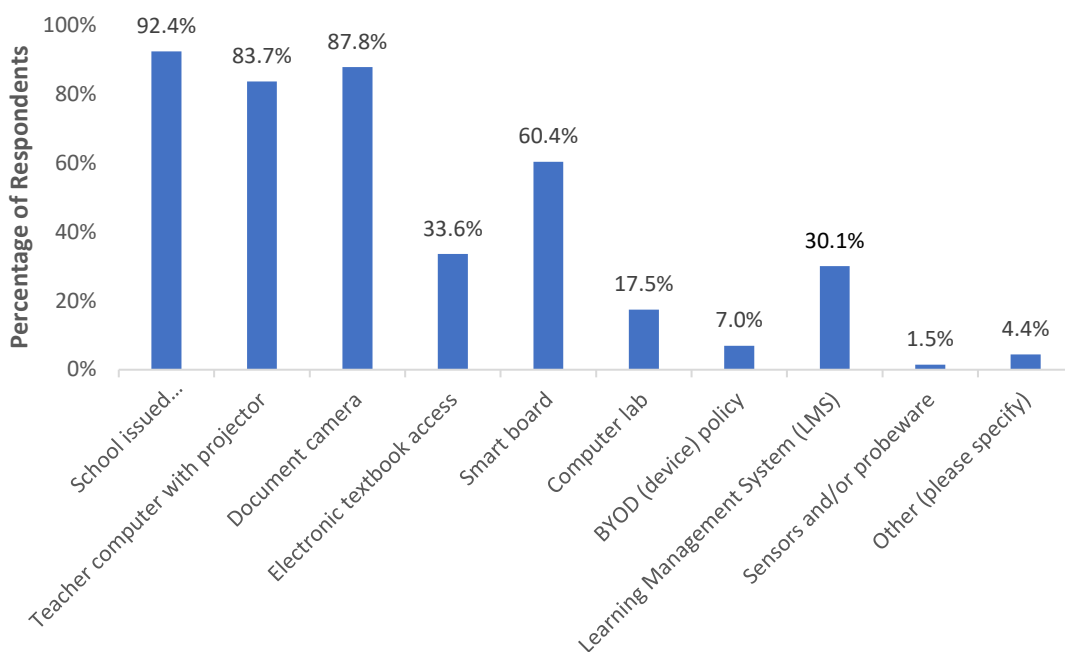
The following section summarizes teacher responses related to the availability of instructional technology. The information is reported by school level.

## Elementary Level

Figure 22 and Table 22 show the responses of elementary teachers related to instructional technology availability. The most commonly available technologies are school issued laptops/Chromebooks/tablets or similar devices (94.4%), document cameras (87.8%), and teacher computer with projector (83.7%).

**Figure 22**

*Types of technology available in elementary classrooms*



**Table 22**

*Types of technology available in elementary classrooms*

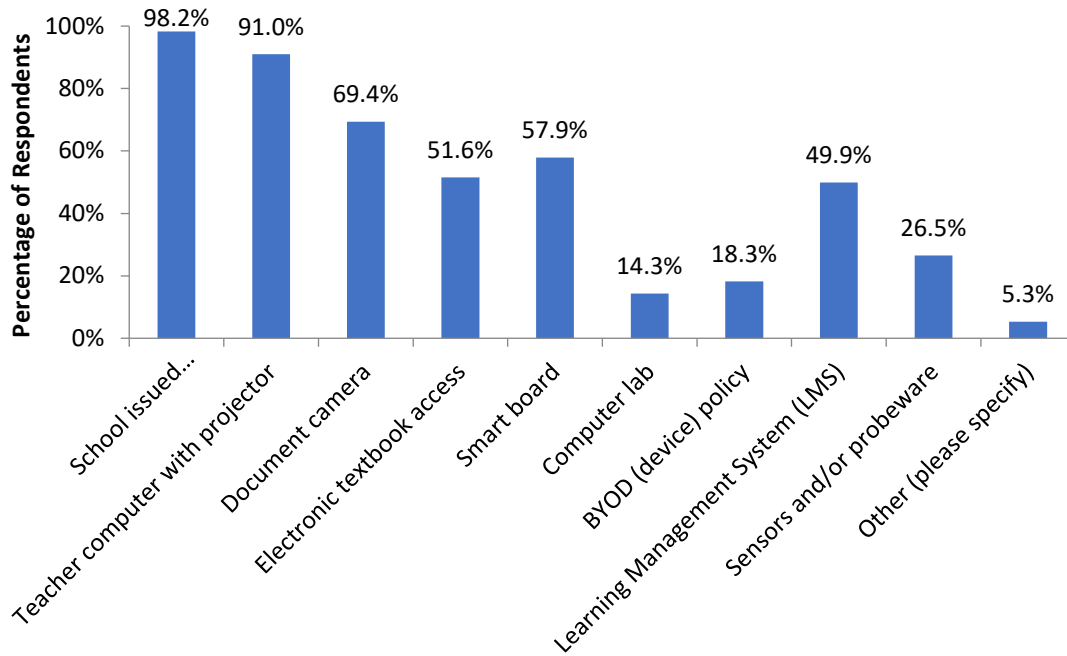
Instructional Technology	Responses	
School issued Laptop/Chromebooks/Tablet or other electronic device for students	92.4%	1,771
Teacher computer with projector	83.7%	1,603
Document camera	87.8%	1,683
Electronic textbook access	33.6%	643
Smart board	60.4%	1,157
Computer lab	17.5%	335
BYOD (device) policy	7.0%	134
Learning Management System (LMS)	30.1%	576
Sensors and/or probe ware	1.5%	29
Other (please specify)	4.4%	85
	<b>Answered</b>	<b>1,916</b>

## Middle School Level

At the middle school level, nearly all teachers (98.2%) report that students have access to school issued laptops/Chromebooks/tablets or similar devices. The next two most found technology types are teacher computers with projectors (91.0%) and document cameras (69.4%). Figure 23 and Table 23 display the data for middle school teachers' responses.

**Figure 23**

*Types of Technology Available in Middle School Science Classrooms*



**Table 23***Types of Technology Available in Middle School Science Classrooms*

<b>Instructional Technology</b>	<b>Responses</b>	
<b>School issued Laptop/Chromebooks/Tablet or other electronic device for students</b>	98.2%	667
<b>Teacher computer with projector</b>	91.0%	618
<b>Document camera</b>	69.4%	471
<b>Electronic textbook access</b>	51.6%	350
<b>Smart board</b>	57.9%	393
<b>Computer lab</b>	14.3%	97
<b>BYOD (device) policy</b>	18.3%	124
<b>Learning Management System (LMS)</b>	49.9%	339
<b>Sensors and/or probe ware</b>	26.5%	180
<b>Other (please specify)</b>	5.3%	36
	<b>Answered</b>	<b>679</b>

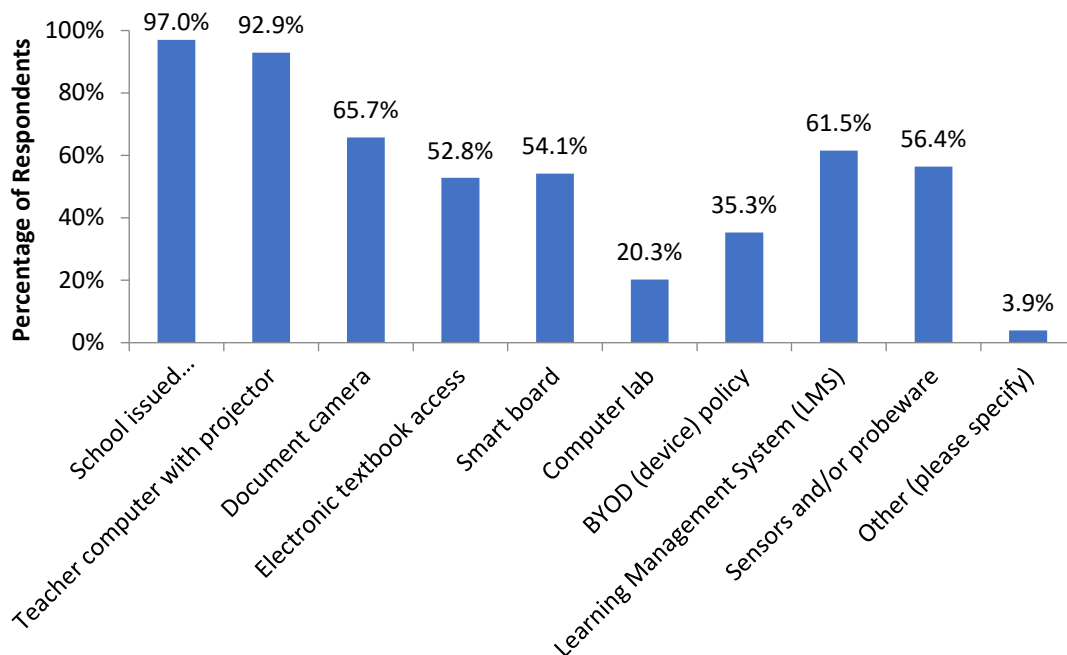
### High School Level

As shown in Figure 24 and Table 24, teachers at the high school level report access to a variety of instructional technologies. As with middle school teachers, nearly all high school teachers (97.0%) report use of school issued laptops/Chromebooks/tablets or similar devices. The next two most reported technologies are teacher computers with projectors (92.9%) and document cameras (65.7%).



**Figure 24**

*Types of Technology Available in High School Science Classrooms*



**Table 24**

*Types of Technology Available in High School Science Classrooms*

Instructional Technology	Responses	
School issued Laptop/Chromebooks/Tablet or other electronic device for students	97.0%	670
Teacher computer with projector	92.9%	642
Document camera	65.7%	454
Electronic textbook access	52.8%	365
Smart board	54.1%	374
Computer lab	20.3%	140
BYOD (device) policy	35.3%	244
Learning Management System (LMS)	61.5%	425
Sensors and/or probe ware	56.4%	390
Other (please specify)	3.9%	27
	<b>Answered</b>	<b>691</b>

## Professional Learning

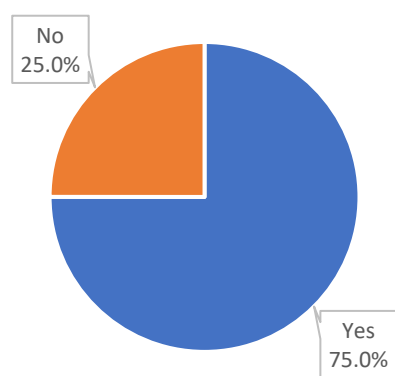
The following section summarizes teachers' responses related to availability and types of professional learning. The information is reported by school level. The section concludes with Science Supervisors' responses about science professional learning offered in their districts.

### Elementary Level

Figure 25 and Table 25 display elementary teachers' perception of the availability of professional learning for science. Approximately 75.0% of elementary teachers report science specific professional learning is available to them.

**Figure 25**

*Elementary Teachers' Indication of Availability of Science Professional Learning*



**Table 25**

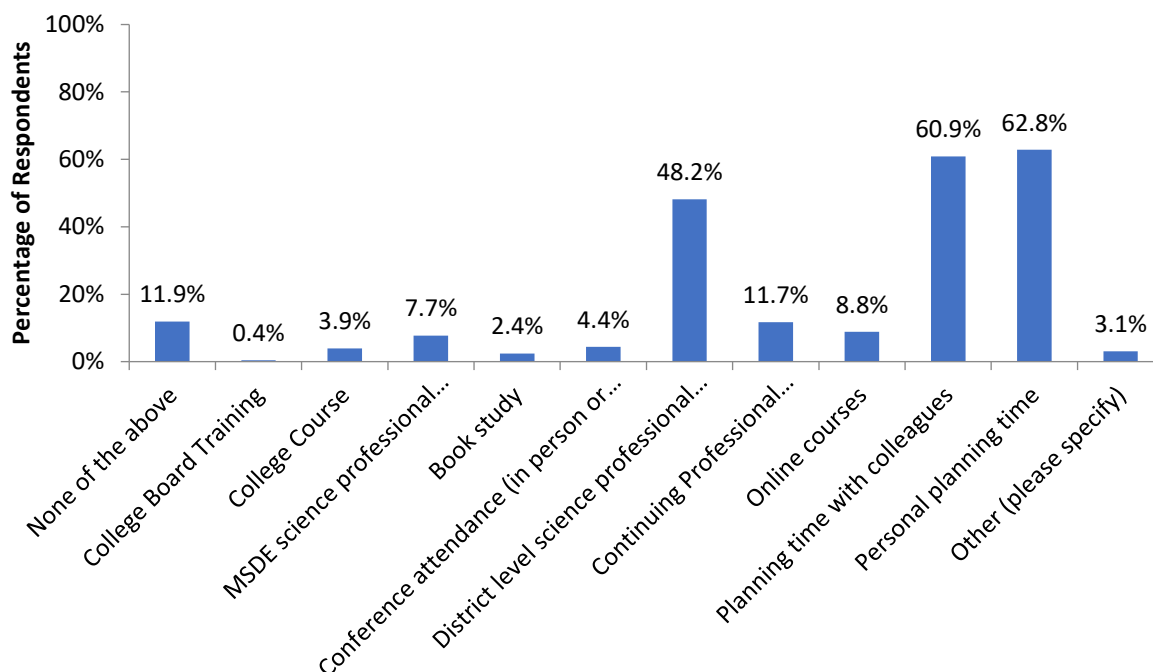
*Elementary Teachers' Indication of Availability of Science Professional Learning*

Access to Science Professional Learning	Responses	
Yes	75.0%	1,426
No	25.0%	475
	<b>Answered</b>	<b>1,901</b>

Figure 26 and Table 26 display the types of professional learning elementary teachers completed. The most common professional learning activity was personal planning time (62.8%). Planning time with colleagues was also frequently reported (60.9%).

**Figure 26**

*Types of Professional Learning Reported by Elementary Teachers*



**Table 26**

*Types of Professional Learning Reported by Elementary Teachers*

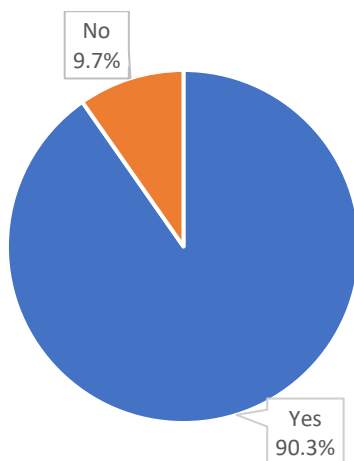
Professional Learning	Responses	
None of the above	11.9%	227
College Board Training	0.4%	7
College Course	3.9%	75
MSDE science professional development	7.7%	148
Book study	2.4%	46
Conference attendance (in person or virtual)	4.4%	84
District level science professional development	48.2%	923
Continuing Professional Development (CPD) course	11.8%	225
Online courses	8.8%	169
Planning time with colleagues	60.9%	1166
Personal planning time	62.8%	1204
Other (please specify)	3.1%	59
	<b>Answered</b>	<b>1916</b>

### Middle School Level

At the middle school level, 90.3% of teachers reported access to professional learning in science as shown in Figure 27 and Table 27.

**Figure 27**

*Middle School Science Teachers' Indication of Availability of Professional Learning*



**Table 27**

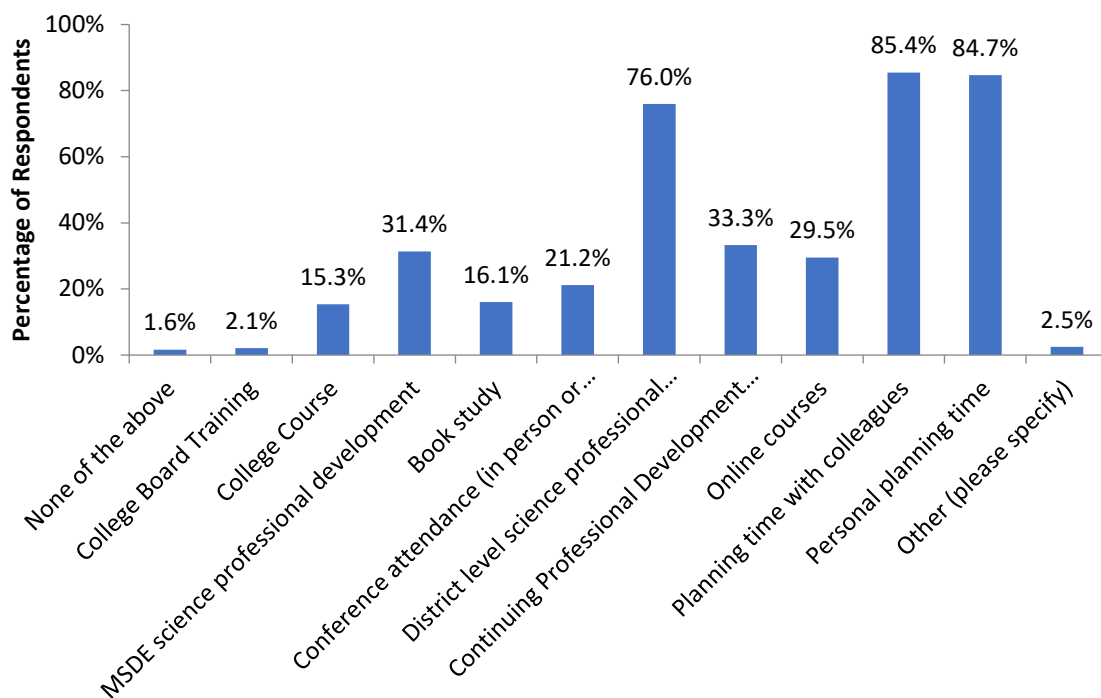
*Middle School Science Teachers' Indication of Availability of Professional Learning*

Access to Science Professional Learning	Responses	
Yes	90.3%	613
No	9.7%	66
	<b>Answered</b>	<b>679</b>

Middle school teachers participated in a variety of professional learning activities. Figure 28 and the corresponding Table 28 show that planning time with colleagues (85.4%) and personal planning time (84.7%) were the most common activities. Approximately 76.0% of middle school science teachers reported participating in district level science professional learning too.

**Figure 28**

*Types of Professional Learning Reported by Middle School Teachers*



**Table 28**

*Types of Professional Learning Reported by Middle School Teachers*

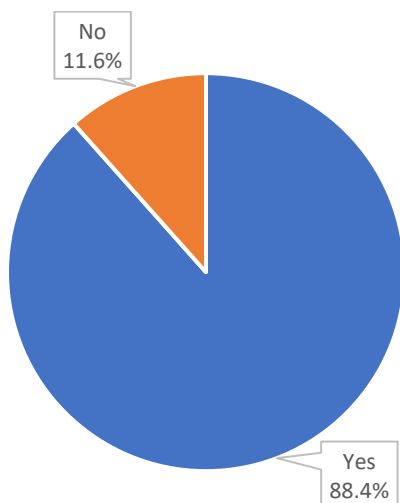
Professional Learning	Responses	Percentage
None of the above	11	1.6%
College Board Training	14	2.1%
College Course	104	15.3%
MSDE science professional development	213	31.4%
Book study	109	16.1%
Conference attendance (in person or virtual)	144	21.2%
District level science professional development	516	76.0%
Continuing Professional Development (CPD) course	226	33.3%
Online courses	200	29.5%
Planning time with colleagues	580	85.4%
Personal planning time	575	84.7%
Other (please specify)	17	2.5%
<b>Answered</b>	<b>679</b>	

## High School Level

Figure 29 and Table 29 display high school teacher responses regarding the availability of professional learning. Approximately 88.4% of teachers reported having access to professional learning.

**Figure 29**

*High School Science Teachers' Indication of Availability of Professional Learning*



**Table 29**

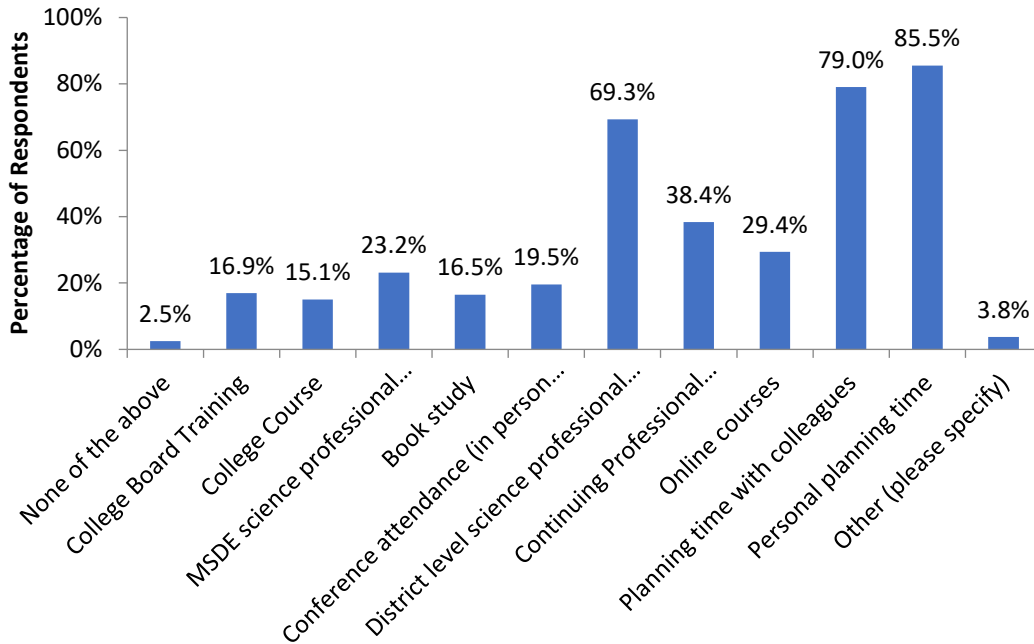
*High School Science Teachers' Indication of Availability of Professional Learning*

Access to Science Professional Learning	Responses	
Yes	88.4%	611
No	11.6%	80
	<b>Answered</b>	<b>691</b>

Figure 30 and the corresponding Table 30 show that high school science teachers participate in an array of professional learning activities. The most common activities are personal planning time (85.5%) and planning time with colleagues (79.0%). Nearly 70% of high school teachers reported availability of district level professional learning in science.

**Figure 30**

*Types of Professional Learning Reported by High School Teachers*



**Table 30**

*Types of Professional Learning Reported by High School Teachers*

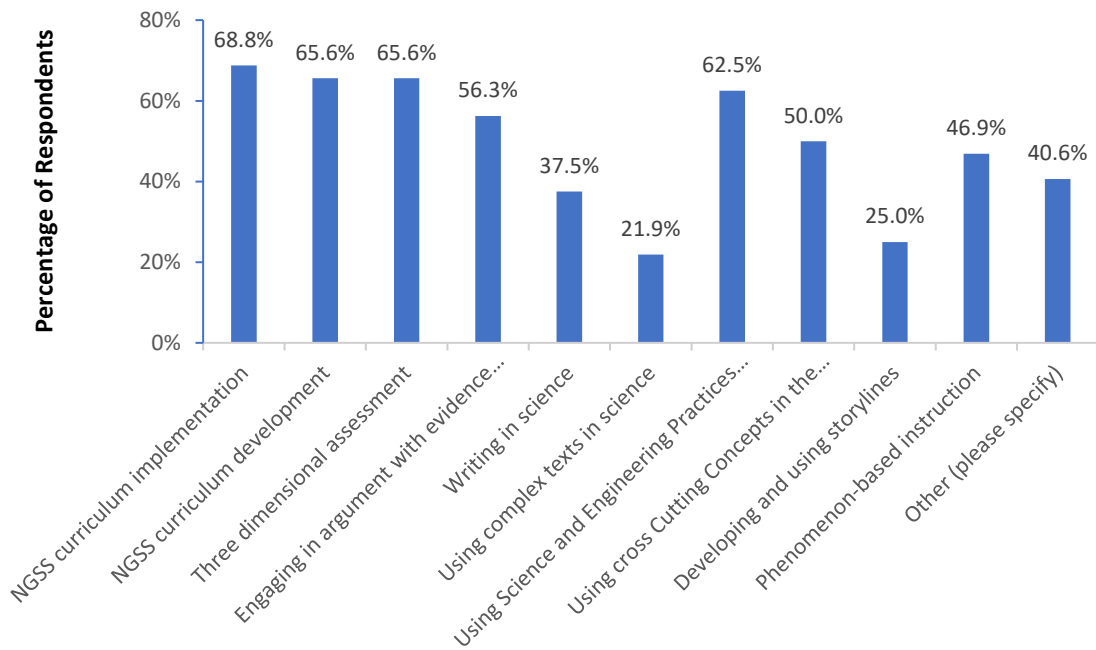
Professional Learning	Responses	
None of the above	2.5%	17
College Board Training	16.9%	117
College Course	15.1%	104
MSDE science professional development	23.2%	160
Book study	16.5%	114
Conference attendance (in person or virtual)	19.5%	135
District level science professional development	69.3%	479
Continuing Professional Development (CPD) course	38.4%	265
Online courses	29.4%	203
Planning time with colleagues	79.0%	546
Personal planning time	85.5%	591
Other (please specify)	3.8%	26
	<b>Answered</b>	<b>691</b>

## Science Supervisor Reports

Science Supervisors' identified science-specific professional learning opportunities offered in their districts for teachers. Figure 31 and the corresponding Table 31 show these results. Over 68% of Science Supervisors identified Next Generation Science Standards (NGSS) curriculum as a professional learning offering. Curriculum development aligned to the NGSS (65.63%), three-dimensional assessment (65.63%), and use of the Science and Engineering Practices were other commonly offered professional learning topics.

**Figure 31**

*Professional Learning Topics Offered in Local School Systems*





**Table 31***Professional Learning Topics Offered in Local School Systems*

District-level Professional Learning Opportunities	Responses	
NGSS curriculum implementation	68.8%	22
NGSS curriculum development	65.6%	21
Three-dimensional assessment	65.6%	21
Engaging in argument with evidence (claim, evidence, reasoning)	56.3%	18
Writing in science	37.5%	12
Using complex texts in science	21.9%	7
Using Science and Engineering Practices in the science classroom	62.5%	20
Using cross Cutting Concepts in the science classroom	50.0%	16
Developing and using storylines	25.0%	8
Phenomenon-based instruction	46.9%	15
Other (please specify)	40.6%	13
	<b>Answered</b>	<b>32</b>

## Teacher Certification

House Bill 1227 Education-Core Content Areas-Accountability Program requires that certification information for science teachers be reported as a part of this annual survey. In past years, Science Supervisors were asked to report information regarding the number of science classes taught by teachers both certified and not certified to teach those classes at the middle school and high school levels. In an effort to reduce burden on local school system personnel, the MSDE Office of Science partnered with the MSDE Office of Accountability to apply certification data already reported by local school systems in this annual report. The data reported in Table 32 reflect certification information for middle school science teachers in the 2019-2020 school year. Table 33 shows the certification information for high school science teachers in the 2019-20 school year.

**Table 32***Certification Information for Middle School Science Teachers in 2019-20*

Local Education Agency	Teachers (in FTE)	In-Field	In-Field Percent	Out-of-Field	Out-of-Field Percent
Allegany	16.5	13.3	80.3	3.3	19.7
Anne Arundel	150.5	135.1	89.8	15.4	10.2
Baltimore	205.1	174.9	85.3	30.2	14.7

Local Education Agency	Teachers (in FTE)	In-Field	In-Field Percent	Out-of-Field	Out-of-Field Percent
Calvert	29.9	27.5	91.8	2.5	8.2
Caroline	13.5	11.5	85.2	2.0	14.8
Carroll	56.5	55.5	98.2	1.0	1.8
Cecil	40.5	39.0	96.3	1.5	3.7
Charles	35.0	35.0	100.0	0.0	0.0
Dorchester	11.5	11.5	100.0	0.0	0.0
Frederick	69.2	55.4	80.1	13.8	19.9
Garrett	9.5	9.5	100.0	0.0	0.0
Harford	72.2	57.0	79.0	15.2	21.0
Howard	124.0	108.7	87.6	15.3	12.4
Kent	5.5	5.5	100.0	0.0	0.0
Montgomery	289.1	268.9	93.0	20.2	7.0
Prince George's	218.7	171.5	78.4	47.2	21.6
Queen Anne's	15.3	14.0	91.8	1.3	8.2
St. Mary's	25.0	24.0	96.0	1.0	4.0
Somerset	6.3	6.1	97.0	0.2	3.0
Talbot	8.5	8.0	94.1	0.5	5.9
Washington	41.5	41.2	99.1	0.4	0.9
Wicomico	19.0	19.0	100.0	0.0	0.0
Worcester	8.0	8.0	100.0	0.0	0.0
Baltimore City	12.3	11.0	89.8	1.3	10.2
<b>State</b>	<b>1,482.9</b>	<b>1,310.9</b>	<b>88.4</b>	<b>171.9</b>	<b>11.6</b>

**Table 33**

*Certification Information for High School Science Teachers in 2019-20*

Local Education Agency	Teachers (in FTE)	In-Field	In-Field Percent	Out-of-Field	Out-of-Field Percent
Allegany	17.9	16.2	90.2	1.8	9.8
Anne Arundel	135.2	119.8	88.6	15.5	11.4
Baltimore	271.9	168.5	62.0	103.4	38.0
Calvert	37.2	24.4	65.6	12.8	34.4
Caroline	13.3	12.0	90.0	1.3	10.0
Carroll	64.7	58.8	91.0	5.8	9.0
Cecil	30.8	27.7	89.9	3.1	10.1
Charles	67.0	67.0	100.0	0.0	0.0
Dorchester	13.1	11.5	87.8	1.6	12.2
Frederick	74.4	45.6	61.2	28.9	38.8
Garrett	9.8	9.8	100.0	0.0	0.0

<b>Local Education Agency</b>	<b>Teachers (in FTE)</b>	<b>In-Field</b>	<b>In-Field Percent</b>	<b>Out-of-Field</b>	<b>Out-of-Field Percent</b>
<b>Harford</b>	76.9	72.5	94.3	4.4	5.7
<b>Howard</b>	161.7	123.3	76.2	38.4	23.8
<b>Kent</b>	4.5	4.5	100.0	0.0	0.0
<b>Montgomery</b>	420.5	370.9	88.2	49.6	11.8
<b>Prince George's</b>	267.0	203.1	76.1	63.8	23.9
<b>Queen Anne's</b>	20.7	18.0	87.0	2.7	13.0
<b>St. Mary's</b>	34.0	33.0	97.1	1.0	2.9
<b>Talbot</b>	7.9	5.5	69.5	2.4	30.5
<b>Washington</b>	47.6	37.5	78.9	10.0	21.1
<b>Wicomico</b>	30.0	29.0	96.7	1.0	3.3
<b>Worcester</b>	18.1	17.8	98.2	0.3	1.8
<b>Baltimore City</b>	131.5	110.0	83.7	21.5	16.3
<b>State</b>	<b>1,955.8</b>	<b>1,586.3</b>	<b>81.1</b>	<b>369.5</b>	<b>18.9</b>