Maryland
STATE DEPARTMENT OF EDUCATION

Annual Survey Report of Science Teachers

Office of Teaching and Learning Instructional Programs and Services

January 2025

MARYLAND STATE DEPARTMENT OF EDUCATION

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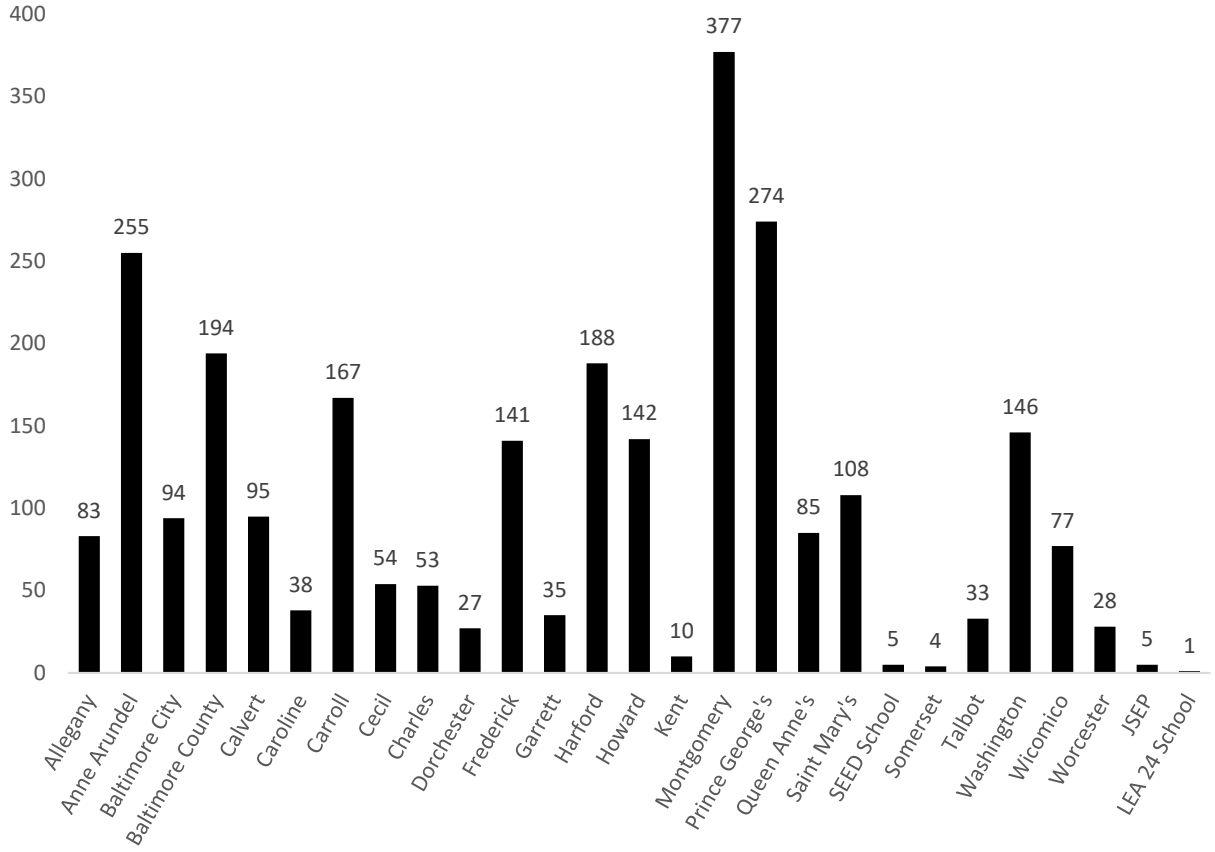
Introduction

Section 7-203(e) of the Education Code of the Annotated Code of Maryland requires the Maryland State Department of Education (MSDE) to survey a statewide, representative sample of public schools and public school teachers annually to measure the amount of instructional time spent on social studies and science instruction in elementary schools, 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 area taught by teacher who are certified in the subject being taught and not certified in the subject being taught.

In accordance with this requirement, the 2024 Annual Survey of Science and Social Studies Teachers was opened on November 1, 2024, and accepted responses until December 6, 2024. The survey collected 3,987 responses, with 43.4% of respondents identifying themselves as teachers in elementary schools, 27.9% identifying themselves as teachers in middle school, and 28.7% identifying themselves as teachers in high schools. Respondents identified themselves as educators within each of Maryland's twenty-four local education agencies (LEA) including several LEA 24 schools, the Juvenile Services Education Program (JSEP) and the SEED School of Maryland.

2,719 (68.2%) of the total survey respondents identified themselves as teachers of science. Of these respondents, 1,495 (55.0%) identified that they taught science in elementary schools, compared to 586 (21.6%) who identified that they taught science in middle schools and 638 (23.5%) who identified that they taught science in high schools. Similar to the respondent trend of the overall survey, science teacher respondents identified themselves as educators within each of Maryland's twenty-four local education agencies (LEA) including a LEA 24 school, the Juvenile Services Education Program (JSEP) and the SEED School of Maryland.

Figure 1: Number of Science Teacher Responses by LEA



This report provides an analysis of the responses related to science instruction in Maryland and is organized by grade bands beginning with elementary school.

Elementary School Science

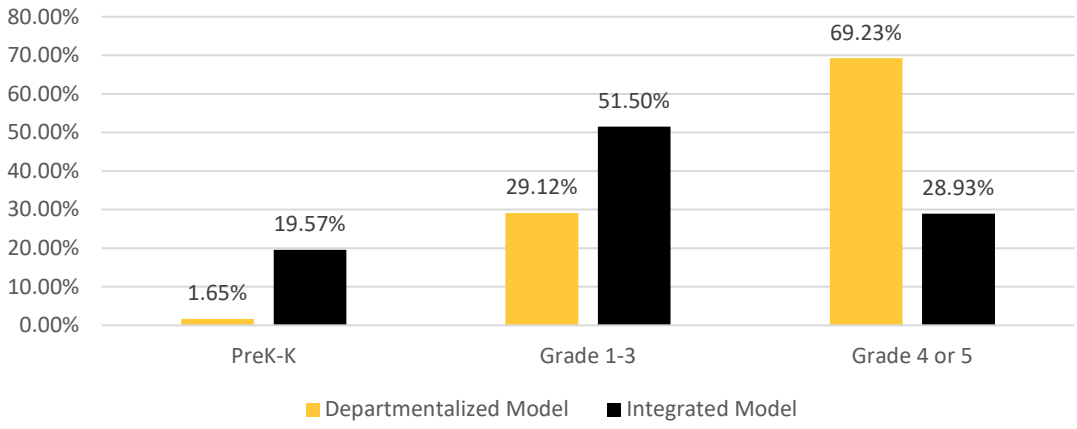
Elementary teacher respondents provided information about the amount of time dedicated to teaching science along with information about instructional methods, instructional resources, technology resources, and professional learning. 1,495 respondents indicated that they taught science in elementary schools.

To describe science instruction at the elementary level, the survey asked teachers to indicate the instructional model employed in their current teaching assignment. For the survey, the models were either **departmentalized** or **integrated**.

- Departmentalized – Teachers are assigned to teach either science or social studies.
- Integrated – Teachers are assigned to teach both science and social studies.

Most respondents (87.6% or 1,309) reported they teach science in elementary classrooms that use an integrated instructional model. The balance of respondents (12.4% or 186) reported teaching science in a departmentalized model. There was some difference in the number of respondents from each grade band based on the various models of instruction. While overall most respondents reported that they teach science within the context of an integrated instructional model, the use of a departmentalized instructional model significantly increases in Grades 4 and 5.

Figure 2: Elementary Grade Band



The data for each reporting category in elementary is disaggregated based on this distinction between different instructional models.

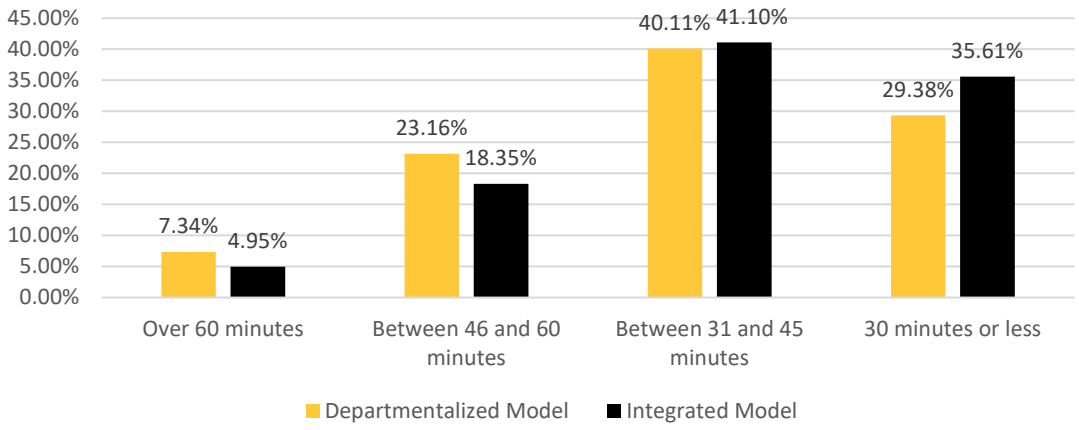
INSTRUCTIONAL TIME

To understand the amount of time available for elementary students to engage with science teaching and learning, the survey asked elementary teachers to provide estimates on the approximate number of minutes and number of days for science instruction.

The majority of respondents from both departmentalized (40.1%) and integrated (41.1%) models report spending between 31 and 45 minutes on science instruction. While the number of respondents

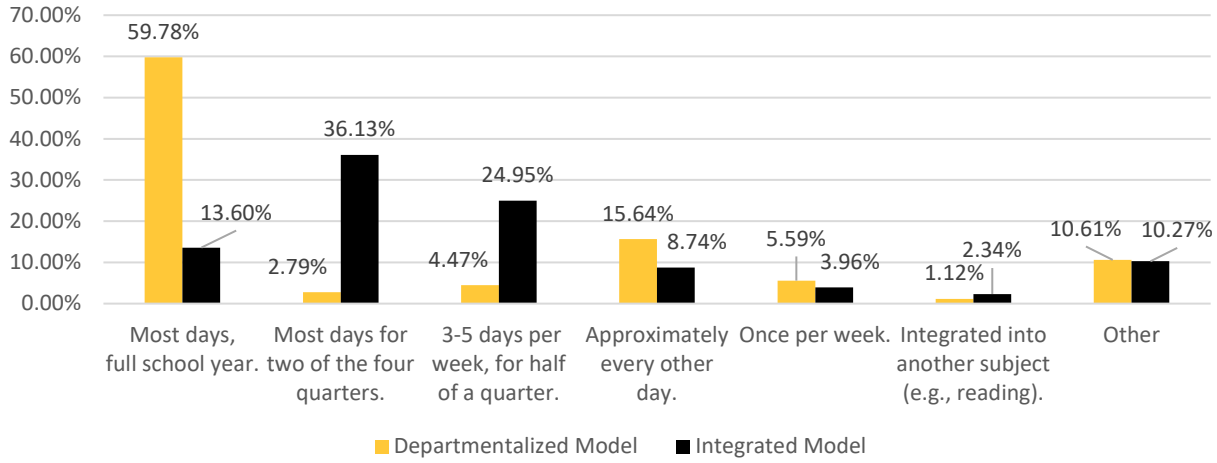
reporting over 45 minutes of science instruction is lower in both models, overall, the departmentalized instructional model indicates slightly more time for science instruction.

Figure 3: Number of Minutes for Science Instruction



The number and distribution of days for science instruction differ across the two instructional models. Students with teachers using the departmentalized model were more likely to engage in science instruction during most days of the school year. Conversely, students in classrooms where the integrated model is in use were more likely to engage in science instruction for about half of the days of the school year (most days, but only for half of each quarter, or for most days during two quarters).

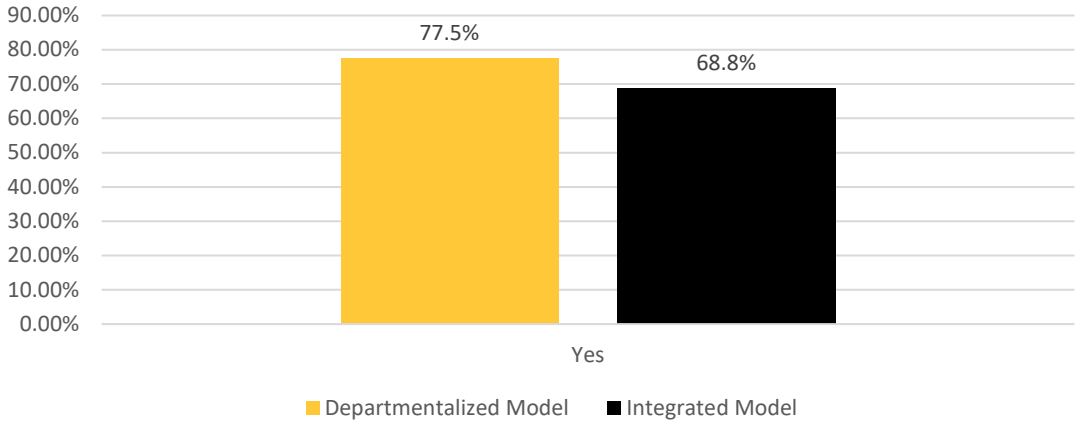
Figure 4: Days Allocated to Science Instruction



INSTRUCTIONAL MATERIALS AND METHODS

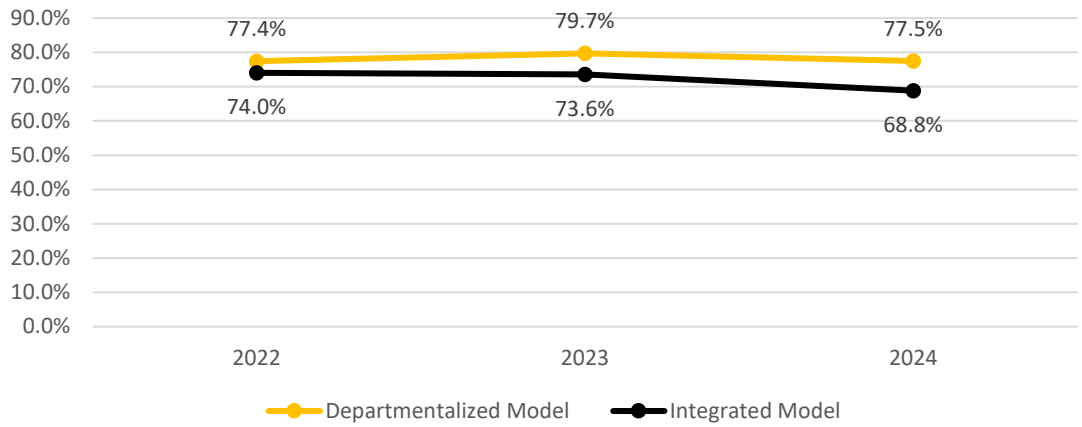
Science instruction is resource intensive, and it is important that students have access to appropriate resources to engage actively in science experiences. The survey asked respondents to indicate whether they had adequate access to laboratory and safety equipment for student use when learning science. Over 77% of teachers in departmentalized classrooms and over 68% of teachers using the integrated instructional model reported adequate access to resources for students to engage in science learning activities.

Figure 5: Elementary School Respondents' Perceptions of Resource Adequacy



Compared to last year's survey, these numbers were down from 82% (-4.7%) for departmentalized and 78% (-9.6%) for the integrated model. The graph shows that over the last three years that respondents in the integrated model have a perception of less adequate access to resources.

Figure 6: Elementary School Respondents' Perceptions of Resource Adequacy Over the Years



The survey asked respondents to indicate the types of instructional resources they use with students. The most reported resources among elementary respondents were:

- District created curriculum and resources (lessons)
- Science videos (e.g. DVD, YouTube, Generation Genius)
- Teacher created instructional materials and lessons
- District purchased curriculum, online or hard copy

The survey also asked respondents to indicate the instructional strategies that are regularly employed for instructing science and supporting students in the science class. The top reported strategies among elementary respondents were:

- Reviewing the Next Generation Science Standards expectations during planning
- Integrating literacy (reading, writing, speaking, listening) standards with intention

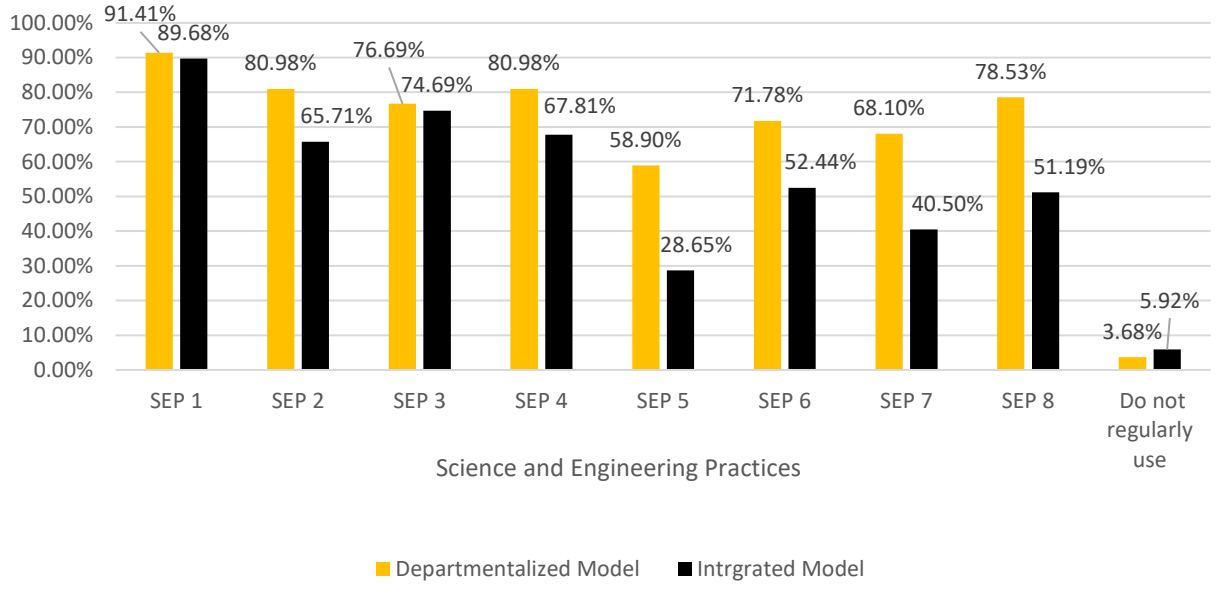
- Incorporating student-designed investigations
- Incorporating phenomenon-based learning
- Optimizing student access to accessible and safe materials

Finally, the survey also asked respondents to indicate the Science and Engineering Practices (SEPs) that they regularly use with intention when students are learning science. The data revealed significant differences in reported SEP use between the two instructional models. For reference there are eight SEPs in the Maryland State Next Generation Science Standards:

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Overall, educators using the departmentalized model of instruction reported greater use of the SEPs in their classrooms. While SEP 5 was reported as being used with intention the least often, classrooms using a departmentalized model of instruction reported the SEP's use significantly more than integrated model of instruction. Respondents using the departmentalized model of instruction also reported significantly higher use of SEP 7 and SEP 8.

Figure 7: Use of Science and Engineering Practices in Elementary Science Instruction



INSTRUCTIONAL TECHNOLOGY

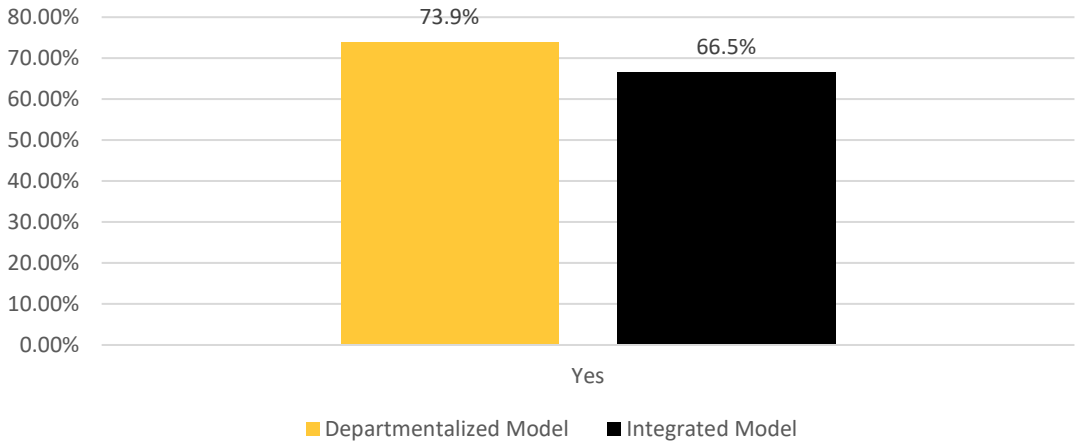
The survey asked respondents to indicate the types of instructional technology available for their use when teaching science. Elementary teachers report using a variety of instructional technologies. Among the most frequently cited were:

- Document camera
- School issued laptop/Chromebook/tablet or other electronic device for students' individual use in school
- Teacher computer with projector or TV(s)
- Interactive display for large group presentations (e.g. Smartboard, Promethean, or Boxlight)
- Web-based video platforms (e.g. YouTube, Generation Genius)

PROFESSIONAL LEARNING

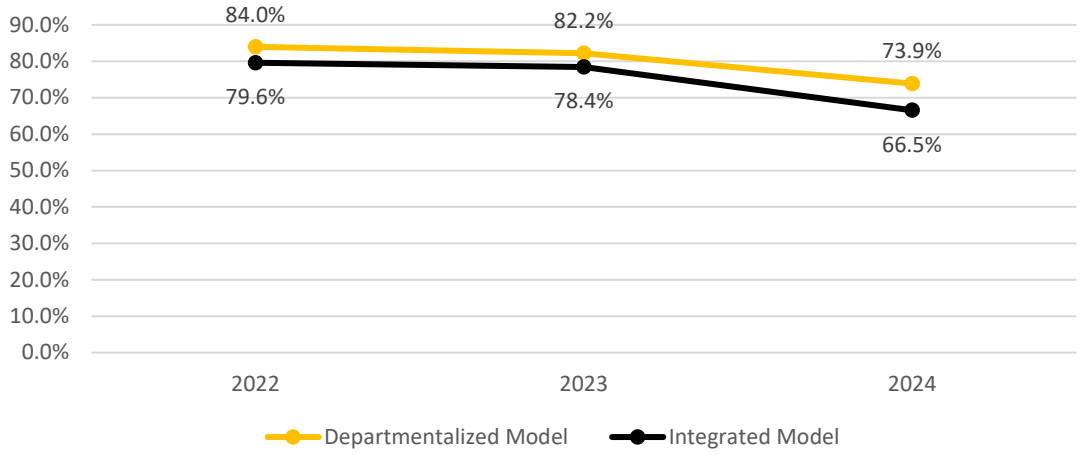
The survey asked respondents to indicate whether professional learning experiences specific to science instruction were available to them from their district. Most elementary level respondents confirmed they had access to science specific professional learning. Respondents in departmentalized classrooms reported slightly more access than respondents using the integrated instructional model.

Figure 8: Availability of Science Specific Professional Learning among Elementary Respondents



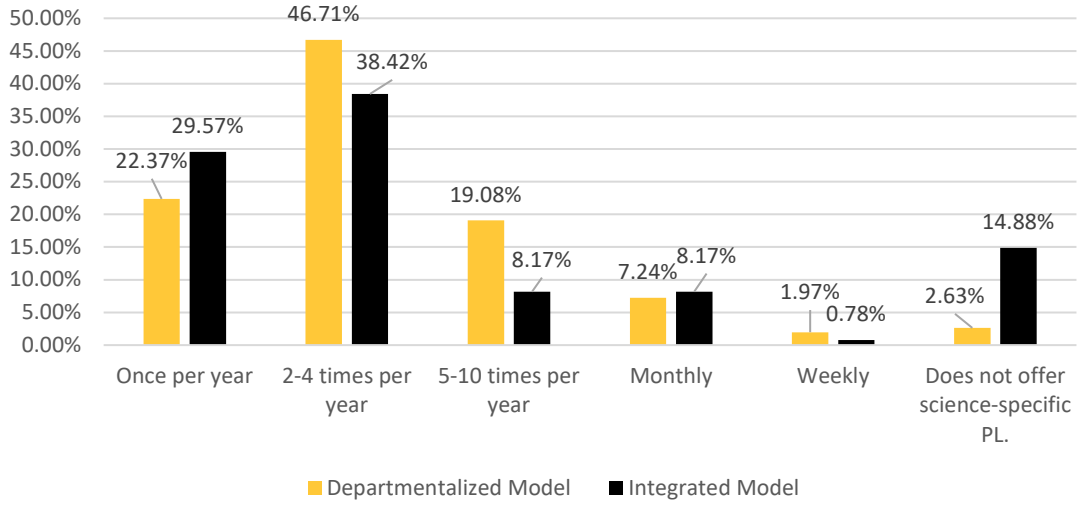
Compared to last year's survey, these numbers were down from 82.2% (-8.3%) for departmentalized and 78.4% (-11.9%) for the integrated model. The graph shows that over the last three years respondents using both instructional models have had a perception of less access to science specific professional learning in their districts.

Figure 9: Availability of Science Specific Professional Learning among Elementary Respondents Over the Years



The survey asked respondents to indicate the frequency at which district-sponsored professional learning opportunities specific to science instruction were offered. The most frequent response between both models was two to four times a school year.

Figure 10: Frequency of District Science Professional Learning for Elementary



The survey asked elementary respondents to indicate the types of professional learning specific to science they have participated in over the last 12 months in the district and outside of it. The most common type of science professional learning reported **in the district** by teachers were:

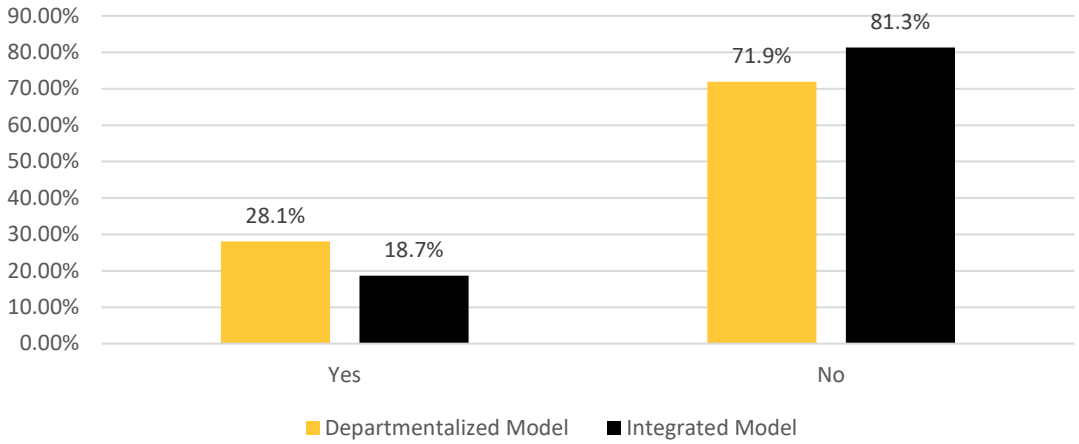
- Districtwide professional learning day(s), prior to student return
- Districtwide professional learning day(s), during the student school year
- School-based professional learning community (PLC)
- Before or after school sessions, compensated

The most common types of science professional learning reported **beyond the district** were:

- Social media (e.g. Facebook groups, online articles)
- MSDE professional learning
- Continuing Professional Development (CPD) course, synchronous
- Continuing Professional Development (CPD) course, asynchronous
- Webinars (e.g. NSTA, AAAS, NOAA)

Finally, the survey asked respondents to indicate if they had been observed in a non-evaluative way or received coaching during the past 12 months during science instruction. Most respondents (over 70%) indicated that they had not been non-evaluatively observed or received coaching during science instruction. Teachers using a departmentalized model of instruction experienced slightly more non-evaluative observations or coaching during science instruction.

Figure 11: Elementary Observed Non-Evaluatively or Received Coaching During Science Instruction



Middle School Science

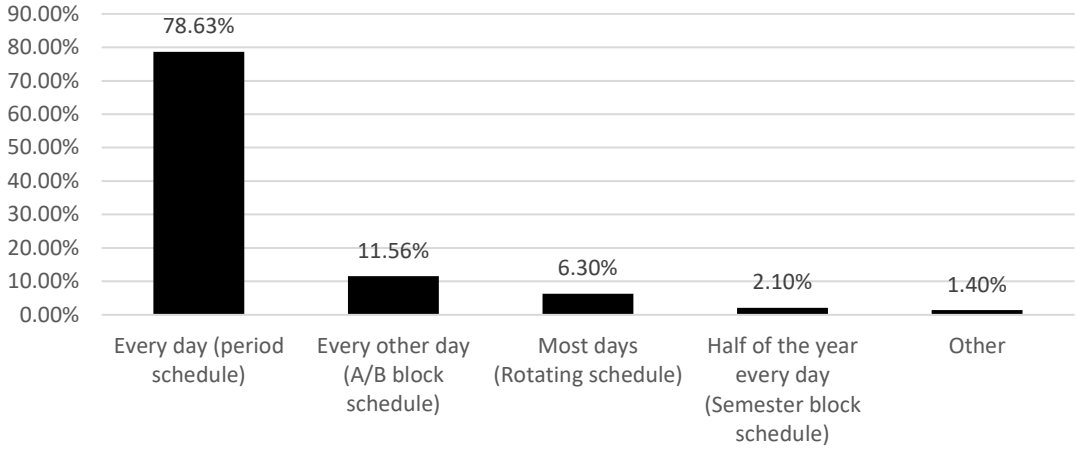
Middle school teacher respondents provided information about the amount of time dedicated to teaching science along with information about instructional methods, instructional resources, technology resources, and professional learning. 589 respondents identified themselves as middle school science teachers.

INSTRUCTIONAL TIME

To understand the models of instructional time at the middle school level, teachers were asked about the schedules that students had related to science instruction.

The majority of respondents (78.6%) report seeing their students every day in a traditional period schedule for science instruction.

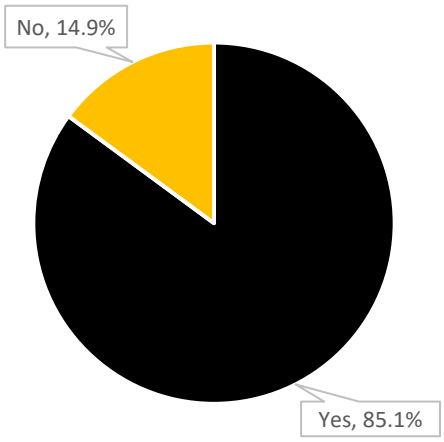
Figure 12: Middle School Student's Science Schedules



INSTRUCTIONAL MATERIALS AND METHODS

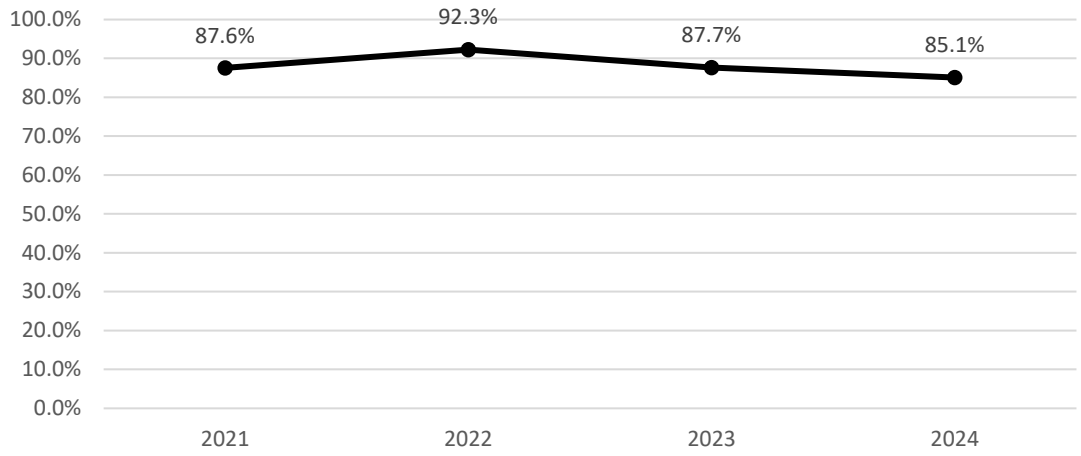
Science instruction is resource intensive, and it is important that students have access to appropriate resources to engage actively in science experiences. The survey asked respondents to indicate whether they had adequate access to laboratory and safety equipment for student use when learning science. Nearly 85% of middle school respondents indicated that appropriate resources were available to students as they engage in science learning activities.

Figure 13: Middle School Respondents' Perception of Resource Adequacy



Compared to last year's survey, this was down from 87.7% (-2.6%). The graph shows that over the last three years respondents have a perception of less adequate access to resources.

Figure 14: Middle School Respondents' Perception of Resource Adequacy Over the Years



The survey asked respondents to indicate the types of instructional resources they use with students. The most reported resources among middle school respondents were:

- Science videos (e.g. DVD, YouTube, Generation Genius)
- Teacher created instructional materials and lessons
- Digital simulations (e.g. PhET, Gizmos)
- Non-consumable (reusable) science and engineering materials (e.g. glassware, microscopes, graduated cylinders, magnets)
- Consumable science and engineering materials (e.g. chemicals, petri dishes, filter paper, straws, wood)

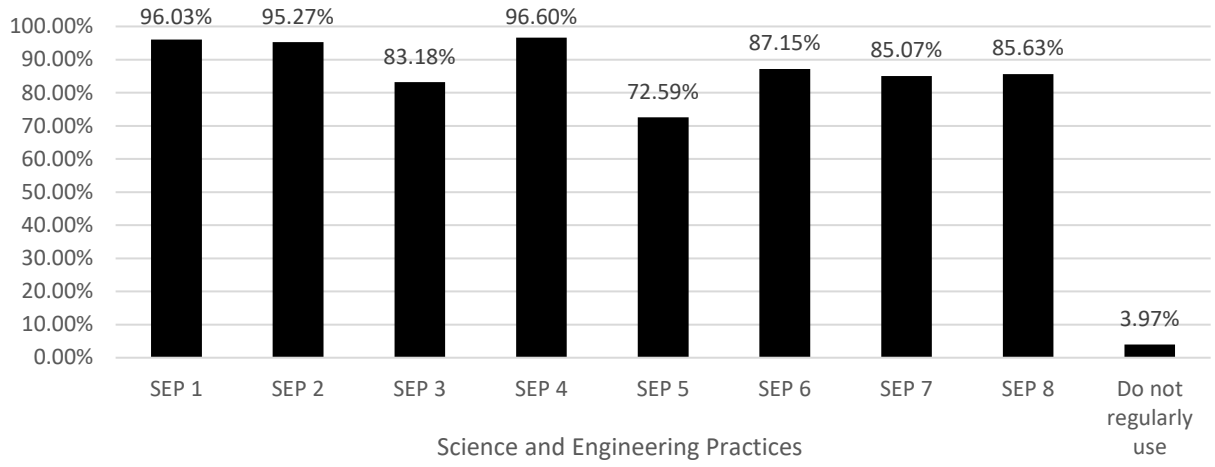
The survey also asked respondents to indicate the instructional strategies that are regularly employed for implementing science teaching and supporting students in the science class. The top reported strategies among middle school respondents were:

- Incorporating phenomenon-based learning
- Reviewing the Next Generation Science Standards expectations during planning
- Integrating literacy (reading, writing, speaking, listening) standards with intention
- Optimizing student access to accessible and safe materials
- Intentionally planning to deliver Specially Designed Instruction (SDI) to support students with disabilities in alignment with their Individual Education Program or 504 Plan

Finally, the survey asked respondents to indicate the Science and Engineering Practices (SEPs) that they regularly use with intention when students are learning science. For reference there are eight SEPs in the Maryland State Next Generation Science Standards:

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Figure 15: Use of Science and Engineering Practices in Middle School Science Instruction



INSTRUCTIONAL TECHNOLOGY

The survey asked respondents to indicate the types of instructional technology available for their use when teaching science. Middle school teachers report using a variety of instructional technologies. Among the most frequently cited were:

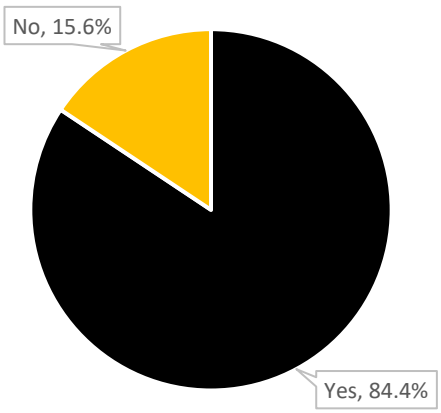
- Web-based instructional games or simulations (e.g. PhET, Gizmos, Legends of Learning)
- Learning Management System (LMS) (e.g. Canvas, Blackboard, Brightspace, Clever)
- Web-based video platforms (e.g. YouTube, Generation Genius)

- School issued laptop/Chromebook/tablet or other electronic device for students' individual use in school
- Teacher computer with projector or TV(s)

PROFESSIONAL LEARNING

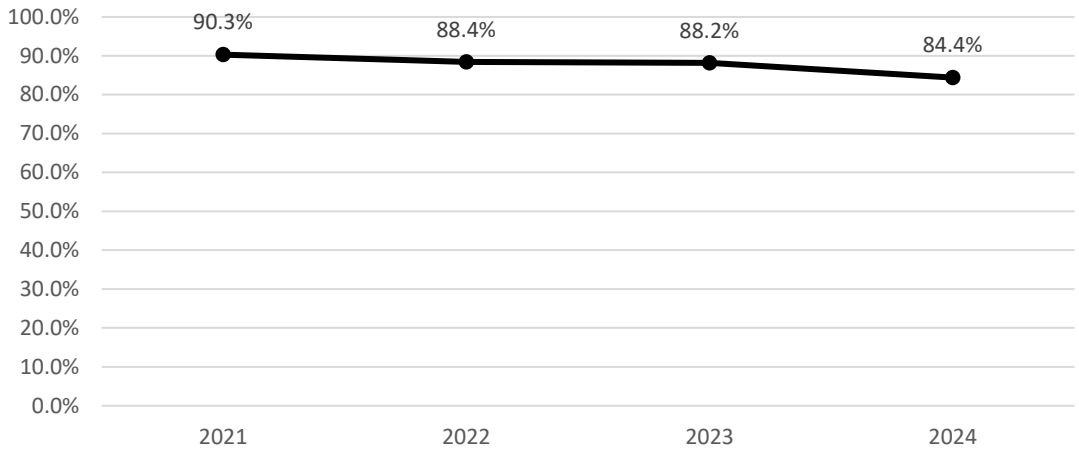
The survey asked respondents to indicate whether professional learning experiences specific to science instruction were available to them from their district. Most (84%) middle school science teachers reported access to district sponsored science-specific professional learning.

Figure 16: Availability of Science Professional Learning for Middle School Respondents



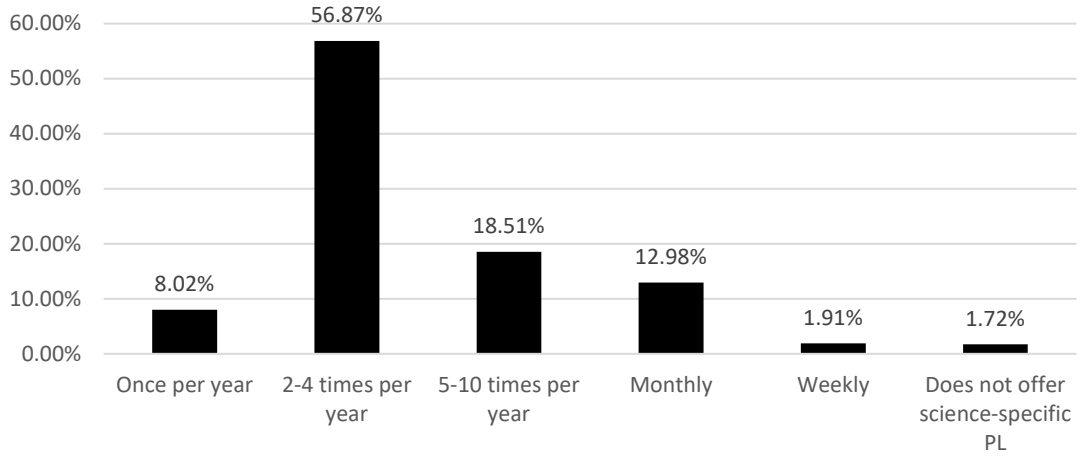
Compared to last year's survey, this was down from 88.2% (-3.8%). The graph shows that over the last four years respondents have a perception of less access to science specific professional learning in their district.

Figure 17: Availability of Science Professional Learning for Middle School Respondents Over the Years



The survey asked respondents to indicate the frequency at which district-sponsored professional learning opportunities specific to science instruction were offered. The most frequent response was two to four times a year.

Figure 18: Frequency of District Science Professional Learning for Middle School



The survey asked middle school respondents to indicate the types of professional learning they have participated in over the last 12 months in the district and outside of it. The most common type of professional learning reported **in the district** by teachers were:

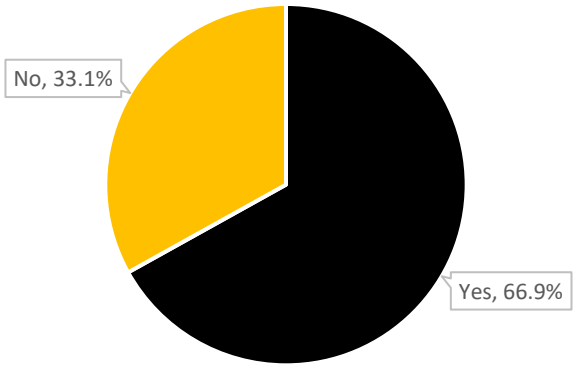
- Districtwide professional learning day(s), prior to student return
- Districtwide professional learning day(s), during the student school year
- School-based professional learning community (PLC)
- Continuing Professional Development (CPD) course (virtual or in-person)
- Summer learning institutes and/or sessions

The most common type of professional learning reported **beyond the district** were:

- Social media (e.g. Facebook groups, online articles)
- MSDE professional learning
- College/university course, synchronous, virtual
- Webinars (e.g. NSTA, AAAS, NOAA)
- Continuing Professional Development (CPD) course, asynchronous

Finally, the survey asked middle school respondents to indicate if they had been observed in a non-evaluative way or received coaching during the past 12 months during science instruction. Most respondents (67%) indicated that they had been non-evaluatively observed or received coaching during science instruction.

Figure 19: Middle Observed Non-Evaluatively or Received Coaching During Science Instruction



High School Science

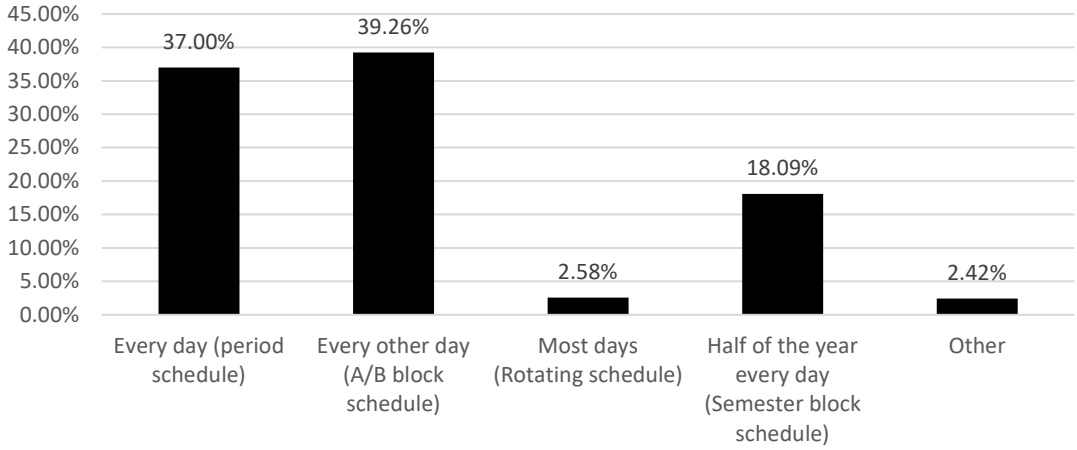
High school teacher respondents provided information about the amount of time dedicated to teaching science along with information about instructional methods, instructional resources, technology resources, and professional learning. 639 respondents identified themselves as high school science teachers.

INSTRUCTIONAL TIME

To understand the models of instructional time at the high school level, teachers were asked about the schedules that students had related to science instruction.

Most respondents (39.3%) report seeing their students every other day in an A/B block schedule for science instruction with every day in a traditional period schedule a very close second (37.0%).

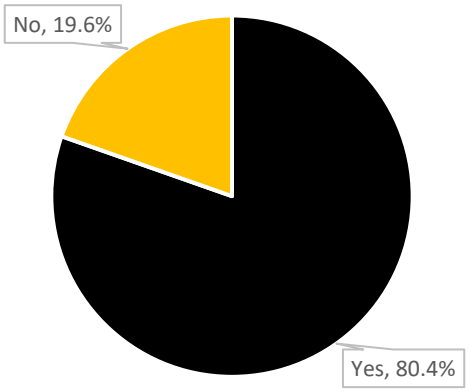
Figure 20: High School Student's Science Schedules



INSTRUCTIONAL MATERIALS AND METHODS

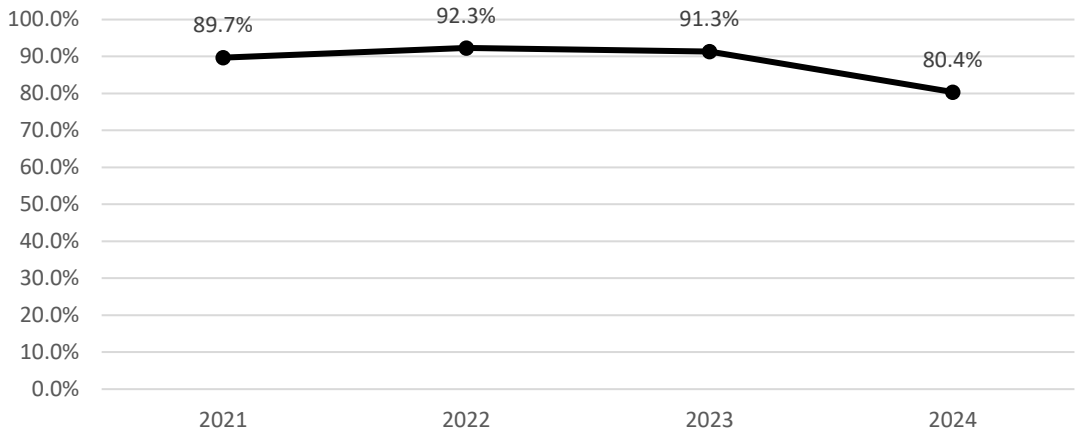
Science instruction is resource intensive, and it is important that students have access to appropriate resources to engage actively in science experiences. The survey asked respondents to indicate whether they had adequate access to laboratory and safety equipment for student use when learning science. Nearly 80% of high school respondents indicated that appropriate resources were available to students as they engage in science learning activities.

Figure 21: High School Respondents' Perceptions of Resource Adequacy



Compared to last year's survey, this was down from 91.3% (-10.9%). The graph shows that over the last three years that respondents have a perception of less adequate access to resources.

Figure 22: High School Respondents' Perceptions of Resource Adequacy Over the Years



The survey asked respondents to indicate the types of instructional resources they use with students. The most reported resources among high school respondents were:

- Teacher created instructional materials and lessons
- Science videos (e.g. DVD, YouTube, Generation Genius)
- Digital simulations (e.g. PhET, Gizmos)
- Personal Protective Equipment (PPE) (e.g. goggles, gloves)
- Non-consumable (reusable) science and engineering materials (e.g. glassware, microscopes, graduated cylinders, magnets)
- Consumable science and engineering materials (e.g. chemicals, petri dishes, filter paper, straws, wood)

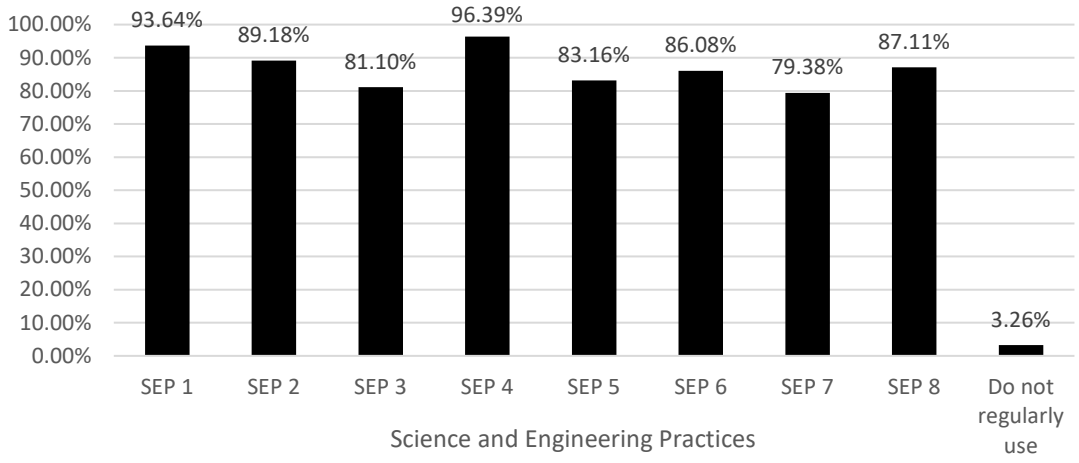
The survey also asked respondents to indicate the instructional strategies that are regularly employed for implementing science teaching and supporting students in the science class. The top reported strategies among high school respondents were:

- Incorporating phenomenon-based learning
- Integrating literacy (reading, writing, speaking, listening) standards with intention
- Optimizing student access to accessible and safe materials
- Reviewing the Next Generation Science Standards expectations during planning
- Intentionally planning to deliver Specially Designed Instruction (SDI) to support students with disabilities in alignment with their Individual Education Program or 504 Plan
- Adapting the anchoring phenomena to be local, meaningful, and accessible

Finally, the survey also asked respondents to indicate the Science and Engineering Practices (SEPs) that they regularly use with intention when students are learning science. For reference there are eight SEPs in the Maryland State Next Generation Science Standards:

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Figure 23: Use of Science and Engineering Practices in High School Science Instruction



INSTRUCTIONAL TECHNOLOGY

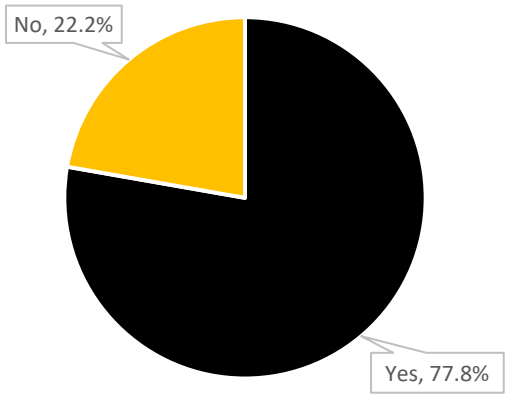
The survey asked respondents to indicate the types of instructional technology available for their use when teaching science. High school teachers report using a variety of instructional technologies. Among the most frequently cited were:

- Learning Management System (LMS) (e.g. Canvas, Blackboard, Brightspace, Clever)
- Web-based instructional games or simulations (e.g. PhET, Gizmos, Legends of Learning)
- School issued laptop/Chromebook/tablet or other electronic device for students' individual use in school
- Web-based video platforms (e.g. YouTube, Generation Genius)
- Digital Tools (e.g. Pear Deck, Kahoot!, Quizlet, Google Classroom, Seesaw)
- Teacher computer with projector or TV(s)

PROFESSIONAL LEARNING

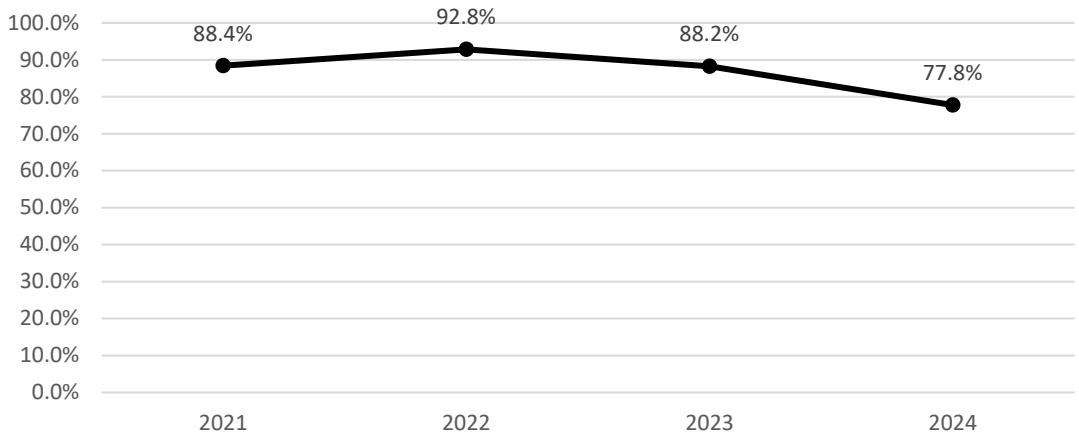
The survey asked respondents to indicate whether professional learning experiences specific to science instruction were available to them from their district. Most (78%) high school science teachers reported access to district sponsored science-specific professional learning.

Figure 24: Availability of Science Specific Professional Learning for High School Respondents



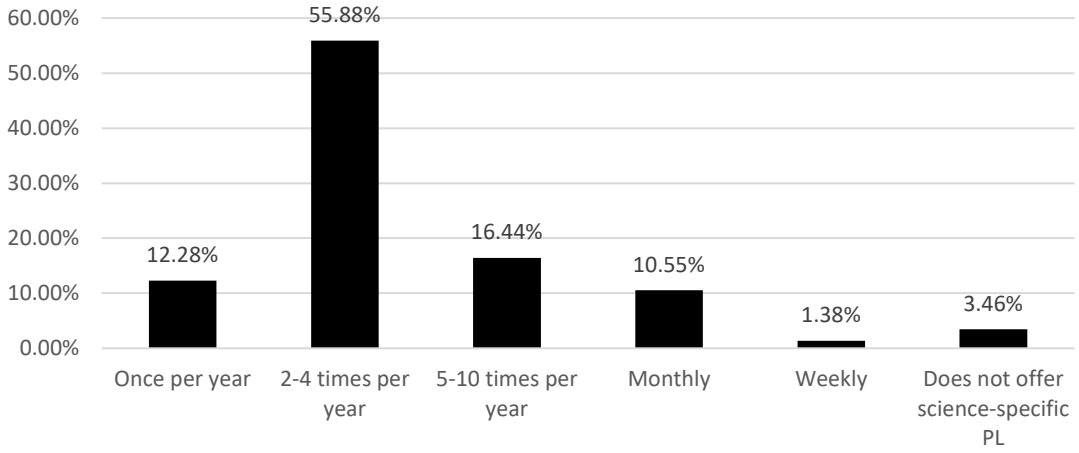
Compared to last year's survey, this was down from 88.2% (-10.4%). The graph shows that over the last three years respondents have had a perception of less access to science specific professional learning in their districts.

Figure 25: Availability of Science Specific Professional Learning for High School Respondents Over the Years



The survey asked respondents to indicate the frequency at which district-sponsored professional learning opportunities specific to science instruction were offered. The most frequent response was two to four times a year.

Figure 26: Frequency of District Science Professional Learning for High School



The survey asked high school respondents to indicate the types of professional learning they participated in over the last 12 months in the district and outside of it. The most common type of professional learning reported **in the district** by teachers were:

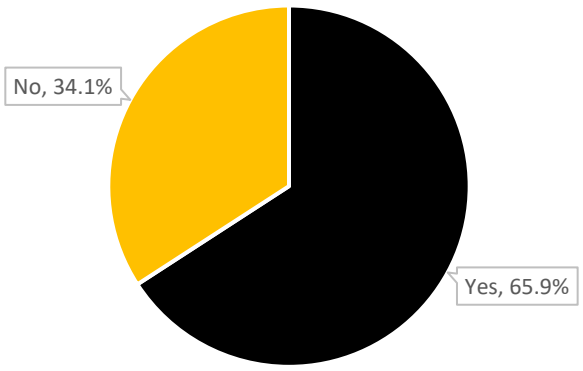
- Districtwide professional learning day(s), prior to student return
- Districtwide professional learning day(s), during the student school year
- School-based professional learning community (PLC)
- Continuing Professional Development (CPD) course (virtual or in-person)
- Summer learning institutes and/or sessions

The most common type of professional learning reported **beyond the district** were:

- Social media (e.g. Facebook groups, online articles)
- MSDE professional learning
- Webinars (e.g. NSTA, AAAS, NOAA)
- College/university course, synchronous, virtual
- Continuing Professional Development (CPD) course, asynchronous

Finally, the survey asked high school respondents to indicate if they had been observed in a non-evaluative way or received coaching during the past 12 months during science instruction. Most respondents (66%) indicated that they had been non-evaluatively observed or received coaching during science instruction.

Figure 27: High Observed Non-Evaluatively or Received Coaching During Science Instruction



Secondary Teacher Certification

At the secondary level, teachers hold certification in particular content areas. Their teaching assignments should correspond to their area of certification. Annually, each LEA reports the number of teachers at the secondary level who are teaching in-field and out-of-field.

- In-field means that the teacher is teaching a class that corresponds to the teacher's certification.
- Out-of-field means that the teacher is teaching a class that does not correspond to the teacher's certification.

Most teachers in each LEA teach within their field of certification. The following table shows the in-field and out-of-field certification status for full-time equivalent (FTE) science teachers in each LEA for the 2022-23 school year.

Figure 28: Secondary Science Teacher Certification Status in School Year 2022-2023

Local Education Agency	Teachers (FTE)	In-Field (FTE)	In-Field (Percent)	Out-of-Field (FTE)	Out-of-Field (Percent)
Allegany	30.03	25.10	83.58	4.93	16.42
Anne Arundel	306.26	233.09	76.11	73.16	23.89
Baltimore City	288.92	251.83	87.16	37.08	12.84
Baltimore	496.87	361.48	72.75	135.39	27.25
Calvert	69.81	50.84	72.82	18.98	27.18
Caroline	24.46	16.46	67.29	8.00	32.71
Carroll	124.00	115.35	93.02	8.65	6.98
Cecil	66.92	62.70	93.69	4.22	6.31
Charles	94.00	94.00	100.00	0.00	0.00
Dorchester	24.05	20.55	85.45	3.50	14.55
Frederick	172.00	151.23	87.92	20.77	12.08

Local Education Agency	Teachers (FTE)	In-Field (FTE)	In-Field (Percent)	Out-of-Field (FTE)	Out-of-Field (Percent)
Garrett	17.34	17.34	100.00	0.00	0.00
Harford	164.84	154.50	93.73	10.33	6.27
Howard	251.13	235.68	93.85	15.45	6.15
Kent	9.00	9.00	100.00	0.00	0.00
Montgomery	626.80	586.80	93.62	40.00	6.38
Prince George's	553.73	444.11	80.20	109.62	19.80
Queen Anne's	34.76	27.58	79.37	7.17	20.63
St. Mary's	65.00	62.00	95.38	3.00	4.62
SEED School	5.00	5.00	100.00	0.00	0.00
Somerset	11.45	8.52	74.41	2.93	25.59
Talbot	20.75	14.90	71.81	5.85	28.19
Washington	96.16	80.36	83.57	15.80	16.43
Wicomico	61.00	59.00	96.72	2.00	3.28
Worcester	27.22	27.22	100.00	0.00	0.00