



Regular Board Meeting: 11/13/2023

Title: K-12 Science Update Report

Type: Discussion

Presenter(s): Mark Carlson, Curriculum Coordinator; and Gavin Mclean, Edina High School Science Department Chair

Description: The 2019 Minnesota Academic Standards in Science were adopted in 2021, and are scheduled for full implementation in the 2024-25 school year. This report is provided to this board as an update on current progress towards meeting the state requirements for full implementation.

Recommendation: There is no recommendation at this time.

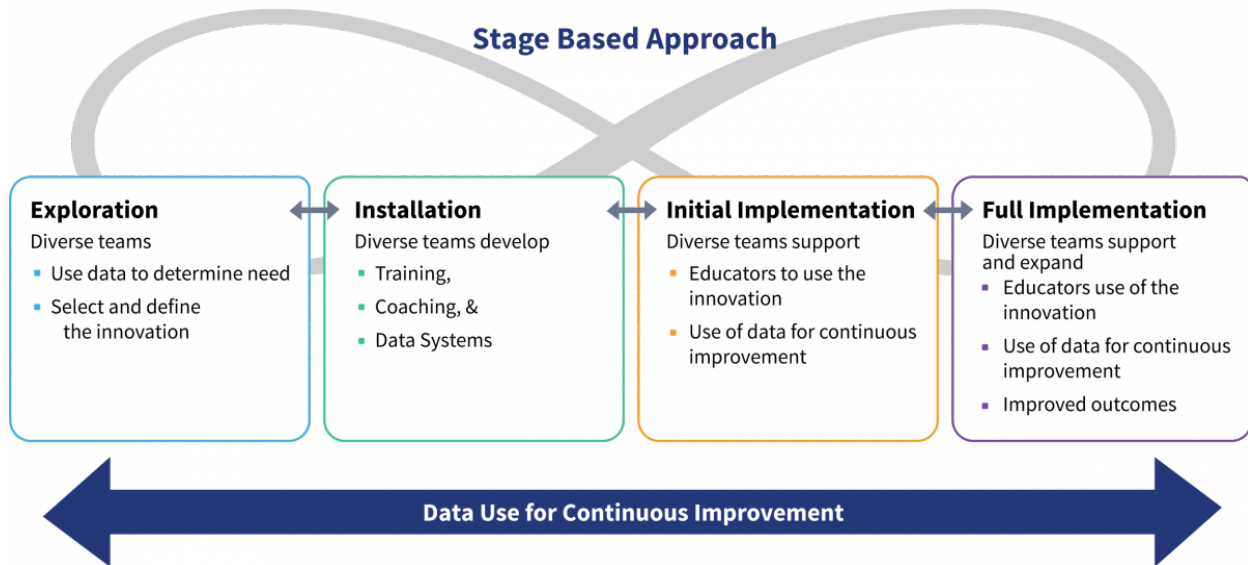
Desired Outcomes for the Board: Please bring forth questions you have for the presenters.

Background Materials:
[Design Team Members](#)

Update of the Implementation of the Minnesota State Science Standards K-12

The Minnesota Department of Education (MDE) adopted the 2019 Academic Standards in Science in 2021, and these standards are scheduled for full implementation in the 2024-25 school year. With full implementation, MDE will begin to assess 5th grade, 8th grade and Biology students on the new MCA IV in the spring of 2025. The purpose of this report is to update the Edina Public Schools School Board on the progress towards implementation of these new standards.

This process began in Edina Public Schools (EPS) during the 2018-19 school year, before the new standards were completed or adopted at the state level. EPS will have all new standards fully in place for the 2024-25 school year across the entire K-12 system. The process has followed the stages of implementation science.



Stage based approach to implementation	Exploration	Installation	Initial Implementation	Full Implementation:
	<ul style="list-style-type: none">Define current realityUnpack standardsResearch best practicesSelect and define the practice/program	<ul style="list-style-type: none">The program/practice has been identified and definedProfessional Development and coaching are used to prepare for the implementationResources are purchasedData systems are prepared	<ul style="list-style-type: none">Educators begin using the program/practiceData is collected around both implementation and student outcomesAdjustments and alignments	<ul style="list-style-type: none">More than 50% of educators are using the program/practice as intendedStudent outcome data is showing improved outcomes

The remainder of this report will examine implementation progress at each level (elementary, middle and high school) along with next steps as we work towards full implementation and continuous improvement. The Teaching and Learning Department would like to recognize the work of the [Science Design Teams](#) as they worked on this change over many years. In addition the secondary science departments and all K-5 classroom teachers, who provided valuable input throughout the implementation process.

Elementary (K-5)

Following an extensive design process, the K-5 Science Design Team recommended and the school board approved the purchase and implementation of Mystery Science as the core curricular resource. Our 3rd-5th grade teachers received professional development around the new standards, the 5e inquiry model and use of these materials throughout the 2022-23 school year. In addition, we provided initial training to our K-2 teachers on these topics this summer and during Workshop Week prior to the start of the school year. Our initial focus has been around the changes that occurred within the standards and the pedagogical shift towards inquiry models that are required to implement these standards. The choice of Mystery Science has provided teachers with a resource that is standards aligned, and is extremely user friendly. This has required minimal training and therefore has allowed for quicker implementation with a high level of fidelity. The training for our K-2 teachers has really been able to focus on the changes in standards and the necessary pedagogical shifts that Mystery Science will provide.

Each classroom received a Mystery Pack containing all non-perishable materials for the lessons being taught in that classroom for the 2023-24 school year. These resources are designed to be purchased on a yearly basis, however this purchase is not financially prudent for EPS. Therefore the Teaching and Learning Department, in coordination with the K-5 Science Design Team, is in the exploration phase of developing a plan to replenish the resources at a fraction of the cost of these Mystery Packs. Teaching and Learning is committed to ensure teachers will continue to have the resources necessary on a yearly basis.

While the resource of Mystery Science is available to Normandale teachers, it is not available in French. Because of this we are exploring several options in conjunction with Normandale administration that will maintain the immersion experience but also ensure students at Normandale receive high quality standards aligned instruction in science. Normandale is currently using the materials available to them in French with adaptations to align with the new standards. We will have a full implementation of resources for the 2024-25 school year.

In addition, The Science Design Team and The Teaching and Learning Department will be coordinating efforts to have select teachers adapt and develop lessons for Minnesota specific standards for indigenous content to be ready for the 2024-25 school year. Teaching and Learning has planned the use of Grade Level Collaboration times, and the February 20th Professional Development days for teachers to extend their learning around the implementation of the new standards and preparing for the new MCA IV at the 5th Grade level. Finally, The Science Design Team will meet quarterly throughout the year to continue to monitor implementation of the standards, our commitments around science instruction and the use of Mystery Science as the core curricular resource.

Middle School (6-8)

The standards review at the middle school began prior to the adoption of the new standards by the State of Minnesota. The Design Team determined it would be appropriate to add an additional pathway to the science sequence beginning in the 2019-20 school year. This was approved by the school board for implementation prior to the 2019-20 school year. This pathway would compact the standards from 6th, 7th and 8th grade into two years allowing students to begin their high school science experience in 8th Grade. This was done to align with the additional physical earth science requirements at the high school level which would eventually require students to take an additional year of physical earth science prior to graduation. This new compacted pathway, allows students to experience science at a faster pace in middle school and provides the possibility for an additional year of science in high school. Please see figure 1 below for a visual that demonstrates the possibility for an additional year of science in high school.

Because of this additional pathway, the middle school was the first level to begin implementation of the new science standards. Teachers at this level started to implement these standards during the 2019-20 school year in the Compacted Science course and were fully implemented across all courses by the 2021-22 school year. This process was difficult, as this transition process took place primarily during the Covid Pandemic. On November 16, 2020, this board approved the purchase and implementation of Amplify Science for 6th-8th grade students. This resource serves as the core curricular material used at the middle level. This is used for all 6th-8th grade science courses and Compacted courses at the 6th and 7th grade level.

As teachers have used the materials, they have found some need to make slight adaptations to enhance the student experience. They have worked hard to provide students with additional hands-on experiments and supplemented the resource with additional lessons on Minnesota specific standards and also standards that were not as developed as the teachers would like. In the summer of 2021 Teaching and Learning ran a two day workshop for 6th-9th grade science teachers to develop proficiency scales for use in middle school courses including the new high school course Physical Earth Science. These scales provide a more accurate and consistent measure of student learning of the new standards to help ensure consistency across middle school classrooms and sites. They helped focus student learning on the essential knowledge and skills from the new standards, and they promoted student advocacy and goal setting around meeting the clearly articulated outcomes from the scales. These new scales helped teachers move to full implementation in the 2021-22 school year.

When doing curricular reviews, one of the tasks is to ensure Edina Public Schools offers courses that foster talent development by ensuring all students have an opportunity to grow and experience an appropriately rigorous environment. Edina Public Schools has the following offerings at the middle school to meet the needs of all learners in science.

Science 6, 7 and 8: This is a rigorous and enriching opportunity for all learners to discover their unique interests and strengths. These courses allow all students to access grade level standards.

Compacted 6th, 7th and Physical Earth Science 8: These are designed to provide opportunities for students to compact grade level standards and be exposed to higher grade level standards. Eventually this pathway provides the possibility for additional elective science courses at Edina High School.

Enriched Science 8: This course provides opportunities for students to engage with grade level content at a deeper level but not at a faster pace.

The middle school science department is in the full implementation phase of implementation science and is working to continually improve across the department. Teachers at this level have been integrally involved in the design and implementation of this new program. These teachers have regularly scheduled Professional Learning Communities (PLC's) to explore student data, pedagogical practices and professional learning to enhance science instruction and learning across the EPS system.

Edina High School (9-12)

The 2019 Minnesota State Science Standards included a new graduation requirement in which all students must complete the new Physical Earth Science standards. This change had a significant impact on courses and sequences of courses at all high schools across the state of Minnesota including Edina High School. To meet this new demand, Edina Public Schools created a new course at the 9th grade level called Physical Earth Science. This course was approved by the school board on January 11, 2021 to first be implemented in the 2021-22 school year at middle schools for students who were taking Compacted Science in 7th grade. The course was then implemented at Edina High School for 9th grade students beginning in the 2022-23 School year. The graduating class of 2026 will be the first class that will need to meet this requirement. The 2026 class will also still need to meet the requirement of 1 year of Biology and 1 year of either Chemistry or Physics to

graduate. With the addition of Physical Earth Science, there are now four disciplines that are taught at Edina High School (Physical Earth, Chemistry, Biology, and Physics).

On December 13, 2021 the school board received an update on the new science course pathways that included the new Physical Earth Science Course. This pathway is the sequence recommended by the Edina High School Science Department. Once a student takes Physical Earth Science they can take the courses in the order they choose, however the one articulation in the graphic below is recommended by the science department. Each discipline provides a choice between a standards level course or extended grade level learning through an enriched course or through earned honors. In addition, students can go beyond high school standards by taking AP courses. Some students can move directly into an AP course based upon past performance in science and completion of work prior to the start of the course. This can happen most frequently for our Biology students. This option is discussed at registration time in science courses, counselors are aware of this option, and the information is available in the course registration guide.

Figure 1

Secondary Science Pathways

Science High School Requirements:

All students must complete:

- 6 semester credits of science.
- Physical Earth Science before taking any other courses.
- one year of a Biology course.
- one year of either a Chemistry or Physics course.

Teacher Recommended Pathways

	Pathway 1	Pathway 2
9th Grade	Phys. Earth Science	Chemistry
10th Grade	Chemistry	Biology
11th Grade	Biology	Physics or Elective
12th Grade	Physics or Elective	Physics or Elective

Pathway 1: Allows for more time for extension/enrichment in middle school and follows state standards by grade level.

Pathway 2: Acceleration of the middle school science standards;
Physical Earth Science completed in 8th Grade.

Note: All MN standards bearing courses will have either an Enriched/Extended Course or Earned Honors available

Elective Courses

Chemistry is a prerequisite for:

AP Chemistry*
Forensics
Organic Chemistry
Physical Universe

Biology is a prerequisite for:

Comparative Anatomy
Environmental Studies
Human Anatomy
AP Environmental Science

Biology & Chemistry are prerequisites for:

AP Biology*

Physical Earth Science is a prerequisite for:

Physics
AP Physics I

Calculus (any level) (concurrent or completed) is a prerequisite for:

AP Physics C

**Students can complete equivalent work determined by EHS Science Dept. to enroll in an AP course without meeting prerequisite. Students can work with high school science teachers and counselors if interested in this option.*

Because of the addition of Physical Earth Standards as a requirement, these standards were the first to be implemented at the high school level. To implement this new course, the 9th grade Physics teachers along with 8th grade science teachers worked to develop the course primarily during the 2020-2021 school year. These teachers were transitioned to teach Physical Earth Science as this became the new course for 9th grade students, replacing Physics. This group of teachers also participated in the development of proficiency scales for this course. These scales were instrumental in the implementation of an Earned Honors designation for students who wanted to go deeper with grade level standards and earn an additional distinction in the course. This option provided an additional pathway for students to demonstrate their learning in science.

The other three science disciplines began professional development for the new standards during the 2021-22 school year. This work continued with the examination of curricular resources during the summer of 2022 and continued in the 2022-23 school year by utilizing professional development days. We had the entire department involved in ensuring students had access to these new standards, and resources were in place to use for instruction. As we begin the 2023-24 school year, Chemistry and Physics courses are fully implementing the new standards. Biology courses are working with the new standards but are being intentional as the Biology MCA for 23-24 is still MCA III which is on the old standards. Therefore they will not be fully implemented until the 2024-25 school year. The teachers have been working tirelessly to ensure students have a quality science experience in all of the four disciplines. Any implementation of new standards requires a great deal of time and effort from our teachers.

Currently we have very few students taking Physics as almost all of our current 11th and 12th grade students had the course in 9th grade. Following the course sequence recommended by teachers (see above), our 9th grade students are taking either Physical Earth Science or Chemistry and our 10th grade students are taking Chemistry or Biology. We expect an increase in enrollment in Physics courses for the 2024-25 and an even greater increase during the 2025-26 school years. We have one small section of Physics for the 2023-24 school year and in this section students can choose to follow the standards based course or work towards Earned Honors similar to our Physical Earth Science course.

When doing curricular reviews, EPS ensures courses are available that foster talent development by ensuring all students have an opportunity to grow and experience an appropriately rigorous environment. Edina High School offers many courses to meet the varied needs of its learners in science. The course offerings in science can be classified into one of the 3 following categories.:

Enrichment: Provide rigorous and enriching opportunities for all learners to discover their unique interests and strengths. This is an integral component of all of our science offerings including our Minnesota Standards Level courses.

Extended Learning: Provides challenging and engaging opportunities for learners to extend their strengths and interests in specific talent areas.

Acceleration: Provides challenging, engaging and faster paced opportunities for learners to advance their strengths and interests in specific talent areas.

The graphic below (figure 2) shows the offering for each of the 4 disciplines and elective courses. From the graphic, you can see that we have a wide variety of courses across these three talent development domains.

Figure 2

Disciplines	MN Standards Level**	Extension**	Acceleration**
Physical Earth Science	Physical Earth - 9	Physical Earth - 9 (EH)	Physical Earth - 8
Chemistry*	Chemistry	Enriched Chemistry	AP Chemistry
Biology	Biology	Enriched Biology	AP Biology
Physics*	Physics	Physics (EH) or AP Physics I	AP Physics C: Mechanics
Notes		Extension ** Additional Electives	
State Requirement		Comparative Anatomy	
* Must take one year of Chemistry or Physics		Environmental Studies	
**Enrichment embedded in all courses		Forensics	
EH - Earned Honors		Human Anatomy	
		Organic Chemistry	
		Physical Universe	
		AP Environmental Science	