



## **K-12 Science Curriculum Review Year 2 Developing**

West St. Paul - Mendota Heights - Eagan Area Schools  
School District 197

---

Prepared by:

**Miles Lawson**

Secondary Curriculum and Gifted and Talented Coordinator

**Kate Skappel**

Elementary Curriculum and Gifted and Talented Coordinator

Date:

August 15, 2022

## Background

The current standards in place in Minnesota in the area of Science were adopted in 2009. The 2009 Minnesota Academic Standards in Science set the expectations for achievement in science for K-12 students in Minnesota. These standards:

- are grounded in the belief that all students can and should be scientifically literate.
- describe a connected body of science and engineering knowledge acquired through active participation in science experiences.
- are placed at the grade level where mastery is expected with the recognition that a progression of learning experiences in earlier grades builds the foundation for mastery later on.

The Minnesota Academic Standards in Science are organized by grade level into four content strands:

- The Nature of Science and Engineering (which is embedded in the content in the other strands)
- Physical Science
- Earth and Space Science
- Life Science

Each strand has three or four sub-strands. Each sub-strand contains two or more standards and one or more benchmarks. The benchmarks supplement the standards by specifying the academic knowledge and skills that schools must offer and students must achieve to satisfactorily complete a standard. Not all standards are found at every grade level.

### State Science Standards Review

The 2019 Minnesota K-12 Academic Standards in Science (Standards) set the expectations for achievement in science for grades K-12 students in Minnesota. The Standards are grounded in the belief that all students can and should be scientifically literate. Scientific literacy enables people to use scientific principles and processes to make personal decisions and to participate in discussions of scientific issues that affect society (NRC, 1996). Graduates should be prepared for career and college opportunities.

The Standards describe a connected body of science and engineering knowledge acquired through active participation in science experiences. These experiences include hands-on laboratory activities rooted in science and engineering practices that are related to an actual phenomena.

The Standards have been submitted for the rulemaking process. The date by which all schools must implement the new standards will be determined during the rulemaking process. The commissioner is recommending that the year of full implementation be 2024-2025. This is the year that the Minnesota Comprehensive Assessment (MCA-IV) would begin to assess the new standards. **This 2024-2025 implementation date indicates the one-year delayed implementation that the Minnesota Department of Education provided due to the impact of the pandemic on curriculum review processes at the district level.**

Once approved, the 2019 K-12 Minnesota Science Standards will consist of three Disciplinary Core Ideas: Physical Science, Life Science, and Earth and Space Science. Each grade level benchmark will include the Science and Engineering Practices and Crosscutting Concepts from the K-12 Framework for Science Education.

## Summary

Beginning In the fall of 2020, a review team (Appendix A) was put together including a representative K-12 group of teachers, as well as building and district administrators, to begin the work of year two tasks associated with the curriculum review process. Due to many factors, largely due to issues surrounding the pandemic, the work of the committee split into two teams, with two different capacities for conducting the work.

The K-8 portion of the committee focused their attention on

- Exploring and identifying resources to support each grade level's storylines and content.
- Evaluating resources through the use of the department-developed instructional materials criteria rubric
- Developing an implementation plan to ensure all students in grades 3, 5 and 10 are prepared for the Spring 2025 MCA-IV in Science.
- Exploring how to integrate, with relevance and authenticity, the American Indian standards in science.
- Identifying curricular programming with Dodge Nature Center that could help address the new standards, as well as exploring capacity for developing new community partnerships.

The high school portion of the committee, which had substantially less time for meeting than the K-8 committee, focused their attention solely on;

- Identifying how to integrate the Earth and Space science standards into a new and required course in 9th grade
- Identifying gaps and overlaps between the 2009 and 2019 science standards in all required courses, and begin to update curriculum plans in each to match the new standards.
- Updating the course sequence at the high school to reflect new state standards and requirements.
- Participating in the earlier stages of reviewing instructional materials for required courses.
- Deepening their knowledge of phenomena-based instruction and three-dimensional learning.
- Developing an implementation plan to ensure students will be prepared for the Spring 2025 MCA-IV in Science.

The K-8 committee arrived at final recommendations for their core set of instructional materials. They will begin implementing these new resources beginning in the fall of 2022. That process is outlined later in this report, under two headings, one for elementary and one for middle school.

While the high school committee will continue the work of reviewing instructional materials, they will not arrive at recommendations for which core set of instructional materials they plan on using, if any, until at the earliest, the spring of 2023.

## American Indian Education in Science

Throughout the curriculum review process, there have been several ways in which the whole team, and small work groups within the team, have been exploring how to authentically integrate American Indian history, perspective, and contributions to science in our current and future science programming. These are noted below.

**Connections between core science resources and American Indian standards.** As the team begins using their selected core resources, one of their ongoing focus areas will be to see where overlaps with our states' American Indian standards in science exist with the resources they are using. Because the resources are typically developed for a nationwide audience, many times they do not include all the important requirements that each state might include in their standards, and American Indian education standards in science for Minnesota is one of these gaps. This will be ongoing and iterative work as the team works through their implementation process.

**Partnerships with Dodge Nature Center.** Several opportunities for integrating American Indian histories and perspectives into how and what students learn about science are found in the various activities that Dodge Nature Center provides for our students. One specific example is found in a sixth grade Dodge experience where connections are made between plant fibers and cloth to aspects of life and experiences of the Dakota people. As planning for the future of Dodge experiences unfolds, we hope to find several other ways in which science and American Indian education can overlap.

**Acquiring resources to review and potentially use.** In collaboration with the American Indian Education liaison, five foundational resources were purchased for the team to use as reference points. These are noted below, along with a brief description of each.

*Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants (Robin Wall Kimmerer)*  
Drawing on her life as an indigenous scientist, a mother, and a woman, Kimmerer shows how other living beings—asters and goldenrod, strawberries and squash, salamanders, algae, and sweetgrass—offer us gifts and lessons, even if we've forgotten how to hear their voices. She circles toward a central argument: that the awakening of a wider ecological consciousness requires the acknowledgment and celebration of our reciprocal relationship with the rest of the living world.

*Original Instructions: Indigenous Teachings for a Sustainable Future (Melissa K. Nelson).*  
Original Instructions evokes the rich indigenous storytelling tradition in this collection of presentations gathered from the annual Bioneers conference. It depicts how the world's native leaders and scholars are safeguarding the original instructions, reminding us about gratitude, kinship, and a reverence for community and creation. Included are more than 20 contemporary indigenous leaders--such as Chief Oren Lyons, John Mohawk, Winona LaDuke, and John Trudell. These beautiful, wise voices remind us where hope lies.

*Native Science: Natural Laws of Interdependence (Gregory Cajete).*  
In Native Science, Gregory Cajete "tells the story" of Indigenous science as a way of understanding, experiencing, and feeling the natural world. He points to parallels and differences between the Indigenous science and Western science paradigms, with special emphasis on environmental/ecological studies. After discussing philosophical foundations, Cajete addresses such topics as history and myth, primal elements, social ecology, animals in myth and reality, plants and human health, and cosmology and astronomy.

*All Our Religions: Native Struggles for Land and Life (Winona LaDuke).*  
This eagerly awaited non-fiction debut by acclaimed Native environmental activist Winona LaDuke is a thoughtful and in-depth account of Native resistance to environmental and cultural degradation. LaDuke's unique understanding of Native ideas and people is born from long years of experience, and her analysis is deepened with inspiring testimonies by local Native activists sharing the struggle for survival. On each page of this volume, LaDuke speaks forcefully for self-determination and community. Hers is a beautiful and daring vision of political, spiritual, and ecological transformation. All Our Relations features chapters on the Seminoles, the Anishinaabeg, the Innu, the Northern Cheyenne, and the Mohawks, among others.

*What Does Justice Look Like? The Struggle for Liberation in Dakota Homeland (Waziyatawin).*  
During the past 150 years, the majority of Minnesotans have not acknowledged the immense and ongoing harms suffered by the Dakota People ever since their homelands were invaded over 200 years ago. Many Dakota people say that the wounds incurred have never healed, and it is clear that the injustices: genocide, ethnic cleansing, mass

executions, death marches, broken treaties, and land theft; have not been made right. The Dakota People paid and continue to pay the ultimate price for Minnesota's statehood. This book explores how we can embark on a path of transformation on the way to respectful coexistence with those whose ancestral homeland this is. Doing justice is central to this process. Without justice, many Dakota say, healing and transformation on both sides cannot occur, and good, authentic relations cannot develop between our Peoples.

## Community Partnerships in Science Education

### **Dodge Nature Center**

As noted earlier in the American Indian Education section, School District 197 and Dodge Nature Center have developed a long-standing partnership in science education. Dodge Nature Center has worked very closely with our school district to help our district meet Minnesota's science standards and has been instrumental in giving our students real-world examples of science concepts. Annually we work with Dodge Nature Center to review their offerings and our needs.

Dodge will remain an important partner in our science programming district-wide. Because our K-8 staff will be focusing on implementation of their core resources, the leadership team at Dodge and our district review teams have decided to wait on making any substantial changes to the current scope and sequence. Once the team has worked through a full year of implementation of these core resources, they will be better equipped to identify where gaps may exist that Dodge Nature Center can help us fill, and/or areas in which Dodge can provide extension and enrichment to science concepts that are covered in the core materials.

### **University of Minnesota's College of Biological Sciences**

The College of Biological Sciences at the University of Minnesota has been in a formal partnership with our district for many years, particularly with Moreland Arts and Health Sciences Elementary and Heritage E-STEM Middle School, as part of the curriculum work associated with their magnet school classification. This partnership was tied to the InSciEd Out program, which was supported by the Mayo Clinic, and this program empowers young learners to investigate society's most pressing health issues so they can ignite measurable and sustainable changes in the health and wellness of their families and communities. This partnership with each school has changed in size and magnitude over time, with the official agreement between the Mayo Clinic and the College of Biological Sciences ending this past year. However, due to the success of the partnership between the College of Biological Sciences, Heritage and Moreland, the teams are developing new ways in which to keep the intent of the program alive and well.

In addition to the InSciEd Out program, the College of Biological Sciences recently teamed up with one of our high school Center for Applied Professional Skills (CAPS) courses, Healthcare Careers. The college has provided speakers for our students in these classes, as well as started a pathway for post-secondary level lab-research internship opportunities for students in this CAPS course to participate in during the internship-focused 2nd semester of the course. In the spring of 2022, three students from the CAPS course were able to participate in this internship opportunity, and the ability to open this up for even more students in coming years is entirely likely.

Other projects potentially on the horizon for this partnership include working with our 9th grade Earth and Space Science teachers to develop laboratory-based experiences for their course which will help prepare students for post-secondary science courses, and teaming up with the science staff at Friendly Hills Middle School and their Greenhouse project.

### **Lower Minnesota River Watershed District**

Our high school Earth and Space science team is developing a strong connection with the Lower MN River Watershed District (LMRWD) as they have been creating the course shell for the new 9th grade Earth and Space Science course. The LMRWD team has been working with our staff to identify ways within the still-forming course to make connections

between physical science, social science, and chemistry skills with water and natural resource principles. While still early in its development, this partnership appears to be able to bring important connections between science skills in the classroom, and the environment and world around us.

### **Great River Greening**

Early connections have been made between the leadership team at Great River Greening and our high school Biology team. This past spring, two groups of students were able to join the Great River Greening staff in working on the ground habitat restoration project that has started at both Two Rivers High School and Garlough Elementary. Future projects with Great River Greening could include prairie planting and larger habitat restoration work in the connected forest between the two sites.

## **K-8 Instructional Materials Selection Phase 1 (2020-21 School Year)**

Prior to previewing resources, the committee reviewed and updated the Instructional Materials Criteria Rubric that was developed during Year 1 of the review process. The Instructional Materials Criteria Rubric can be found in Appendix B. This rubric would be used to help evaluate resources at each stage of the review process, which is outlined below.

In the fall of 2020, the Curriculum, Instruction, and Assessment department conducted a wide review of science programs that could be explored with the review team. Sixteen programs in all were identified as candidates to share with the K-8 Committee. On November 18, 2020, the K-8 committee met virtually to begin the process of narrowing this list of sixteen down using the following criteria;

- Identify at least 4, but no more than 6, sets of resources to move forward with the review
- Ideally, at least one set of resources for each grouping below;
  - Set of materials that span K-6 and/or a set material that span K-8
  - Set of materials that span K-12
- Materials must have defensibility for how they are authentically culturally relevant

In addition to the Instructional Materials Criteria Rubric, the committee used the following criteria;

- General impact reports (Best Evidence Encyclopedia, What Works Clearinghouse)
- State or district evaluations of each program
- Independent Reviews: EdReports

As a result of this first stage of the review, the committee narrowed the program list down to six to explore more thoroughly. These six programs are listed below;

- Amplify Science
- Elevate Science
- Exploring Science (National Geographic)
- FOSS
- Inspire Science
- Smithsonian (Carolina Biological)

On December 21st and 22nd, 2020, the K-8 science review team began officially exploring the six sets of curricular resources that were identified by the review team during the initial resource scan, which was held on November 18th. The team was tasked with identifying two or three resources that they may want to review further, with the additional caveat being that at least one of the resources needed to span K-8. The review team used the instructional materials criteria rubric that they developed to guide them in their decision-making process.

The entire process on December 21st and 22nd was conducted virtually, however print materials were provided for each member as well so they could review the materials at home. On December 21st, each of the six programs provided a 30 minute overview, along with a 15 minute question and answer session following right afterwards. On December 22nd, each of the programs provided open office hours to provide our review team members the opportunity to participate in question and answer sessions. Each member was provided up to 3.5 hours of compensation for their time spent reviewing resources on the 22nd. All staff had the opportunity to attend additional office hours with any of the vendors on day 2 to learn more and to ask questions that they have.

The committee’s recommendation following these two days were to move forward three programs;

- Amplify Science
- Elevate Science
- Inspire Science

At the elementary level, Inspire appeared to have a slightly higher interest, when accounting for first and second choice votes versus Elevate. At the middle level, there was no difference at all between Elevate and Inspire when accounting for first and second choice votes. Amplify, while third in terms of first and second choice interest, did receive the least number of total choice votes, and nearly all of the choice votes were from the middle level. None of the other three programs received any votes or nominations.

At this point the committee broke off into K-4 and 5-8 sub committees, where they would begin developing a process for exploring each of the three programs with students in classroom settings. Those processes are described further in this report, under the Elementary and Middle School Selection Processes for Phase 2.

**K-4 Instructional Materials Selection Process - Phase 2 (2021-22 School Year)**

For our K-4 Product Exploration we began using resources during Quarter 3 of the 21-22 school year. Due to the pandemic and finally being back to full time in-person learning we did not feel it was wise to ask our elementary teachers to learn a new resource they were only going to use for a short time for this exploration. Elementary staff have a lot on their plate throughout a school day so we decided we would have our science specialists at the three magnet elementary schools and one teacher from each of our non-magnet schools to explore these products.

Trainers from Inspire, Elevate and Amplify trained our teachers in the use of the materials and technology resources. Teachers took one unit back to try with their students. Each teacher tried two different products: one during quarter 3 and one during quarter 4.

Grade	School	Quarter 3 Product	Unit	Quarter 4 Product	Unit
K	Somerset	<a href="#">Inspire</a>	Living Things	<a href="#">Elevate</a>	Motion and Forces/Electricity and Magnetism
1	Moreland	<a href="#">Elevate</a>	Nature Copycats	<a href="#">Amplify</a>	Animal & Plant Defensives
2	Garlough	<a href="#">Inspire</a>	Properties of Materials	<a href="#">Amplify</a>	Plant and Animal Relationships (esp. Interested in seed dispersal)
3	Pilot Knob	<a href="#">Elevate</a>	Life Cycles and Traits	<a href="#">Amplify</a>	Environments and Survival
4	Mendota	<a href="#">Inspire</a>	Using Energy	<a href="#">Elevate</a>	Human Body Systems

The team met in early April to discuss their experiences with the materials. A summary of the findings is found below:

### **Amplify Science**

- Lessons require that they are taught in a specific order, not easy to modify or move around as needed to meet our state standards.
- Technology resources were well laid out and easy to access. Teacher online resources were available in PowerPoint and Google Slides.
- Phenomena simulations are well done and engaging but lack hands-on science elements.
- Units on living things lacked experience with actual living organisms.
- Materials well organized and complete.

### **Elevate Science**

- Our team originally started out with the hands-on lab notebook version of Elevate as that is the experience we want for our students. We found this version lacked the background for teachers and students so we asked for the full curriculum version.
- Lessons are able to be moved around and adapted to meet our state standards.
- Units on living things lacked experience with actual living organisms.
- Labs were very prescribed and did not foster student inquiry to the level for which we were looking.
- Material kits were organized but didn't include all materials needed (paper clips, toothpicks, etc).

### **Inspire Science**

- Units are adaptable to meet state standards - publisher has provided a guide for this specific to MN.
- Reading materials are provided at multiple levels (below, at, above grade level as well as an ELL version)
- Student labs are engaging and inquiry based.
- All resources available via the web portal and can be read to the student as well as available in Spanish.
- Material kits were organized but didn't include all materials needed (paper clips, toothpicks, etc).

The committee recommended Inspire Science for K-4 science resources. As with all curriculum we will need to ensure that material ordering, standard alignment and professional development are well developed to maximize the impact of the resources we purchase. Students will have access to the online and print resources which include a student lab book, leveled readers and hands on materials.

## **5-8 Instructional Materials Selection Process - Phase 2 (2021-22 School Year)**

As described above in the summary segment of this report, the Gr 5-8 committee was charged with conducting the closest review possible of the remaining three resources; Amplify Science, Elevate Science, and Inspire Science. As noted earlier, we were not able to utilize school-year days to bring the team together to do this type of review work because of all the pandemic-related circumstances, so the earliest that the team could begin this work was during the summer of 2021.

The committee was able to use the Training Academy structure to provide time and resources for staff to meet across three days during that summer. The focus of those three sessions were;

- Conduct program explorations with each of the three remaining science programs
- Participate in training related to science programs so that they can try them with students in classroom settings
- Exploring how to integrate, with relevance and authenticity, the American Indian standards in science
- Identifying what the curricular programming with Dodge Nature Center could be to help address the new standards, as well as exploring capacity for developing new community partnerships.



As the work unfolded, the team found that in order to integrate the American Indian standards, as well as identify how Dodge Nature Center could support the new standards, they needed to first arrive at a final recommendation from the three remaining programs. Preliminary discussions on each of those two topics were held, however, the majority of that work would best start once the team was creating their scope and sequences for the new program. Therefore, the majority of the committee's time and resources were devoted in the summer of 2021 to training in, and preparation of, the three science program's use in the classroom, beginning in fall 2021.

Prior to the first training session, meetings were held with each of the vendors to have them share their model program exploration approach, so that our committee was able to use their resources with the most fidelity as possible, which ultimately would lead to the most informed recommendation on each program. These model approaches from each vendor are summarized below;

- Inspire wanted to train and explore closely together - therefore only quarter 1
- Amplify wanted that as well, however they are fine with train/implement quarter 2 only
- Elevate was flexible - Train in July, implement round 1 in quarter 2, Train in October, round 2 in quarter 2
- Each wanted access during exploration for potential support for teachers (office hours, etc.)

Once the vendor's requests were received, they were integrated with what the committee believed would be the ideal structure for the staff on the committee. As a result, the final approach for how to move ahead with the program exploration was created, and is described below;

- Use summer sessions as a method in which to review each program
- Use summer sessions, when possible, to provide training for each program
- Use natural breaks in calendar to make program transitions (end/beginning of quarters)
- Sufficient time to explore each program (one per quarter)
- Keep teams of teachers at sites together whenever possible
- Minimize the number of programs/preps for any one teacher (e.g., Grade 7 and 8 at HMS)
- Balance as much as possible the number of people from each building and with each program
- Each early member participates in two rounds of exploration (quarter 1 and quarter 2)
- Develop a process to include members joining at a later date (participate in one round during quarter 2)
- When applicable (or provided), consider the unit(s) most highly recommended to use
- Allow flexibility for staff to make final decisions on what content/unit and when
- Although grades and content are changing (6 and 8 swap), maintain current focus at grade

Over the course of the three summer sessions then, all staff participated in the preparatory activities for the programs they were going to be using during quarter 1. These activities included;

- Reviewing their personal notes on each program from their work on November 20th, December 21st and 22nd.
- Reviewing the instructional materials criteria rubric to help orient their attention on what areas will be evaluated
- Reviewing the findings from Year 1's work, specifically their findings on strengths and weaknesses, and the areas identified in the four-way-equity-test
- Reviewing a variety of published reports and studies related to the efficacy of each program
- Participating in formal training from each vendor, which included time spent on instruction, materials, pedagogy and assessments
- Utilizing digital components that are integrated in each program, as well as training on how those digital components can be used in Canvas
- Selecting the specific unit(s) that they would be teaching for each program
- Identifying what materials would be necessary to teach the units they were selecting
- Developing scope and sequences and unit plans that would be used to pace their instruction accordingly

- And lastly, reviewing the Implementation Evaluation tools for each program which will be used following their use of that program to help determine what level of us the staff member had for the program.

The Gr 5-8 committee began using the programs soon after the start of the school year in their classrooms with their students. Every four to six weeks all the way through the new year, our committee reconvened as a group to both review and troubleshoot the first 4-6 weeks of program use, as well as prepare for the final 4-6 weeks of program use. Trainers were made available during these mid-quarter check-ins to help problem solve, brainstorm, and provide overall general support. Each program also provided on-demand support as well, through email, scheduled and non-scheduled virtual meetings, and phone calls.

As each quarter 1 was coming to an end, the committee convened again and participated in another set of training with each of the programs that they would be using for quarter 2. Additionally, any science teacher at either middle school who was not able to join the summer training could now jump in and participate in the second round of program explorations if they were able to attend these training sessions. Within three weeks of quarter 1's close, all the teams were up and running with their new program to try in their classrooms.

The original timeline for synthesizing their experiences and insights for these program explorations included two dates near the end of semester one. There was to be a meeting in January, which was going to be where all the information about their program explorations was to be collected and reviewed. Preliminary discussions were going to occur about their initial reactions to each program, and one final formalized session with trainers and representatives from each program were to be on hand (in-person and/or virtually) to discuss final questions and concerns. However, this meeting date coincided with the January 2022 COVID surge, and with an abundance of caution in mind, this meeting was canceled, and the work would have to shift to the second date that was on the calendar for February.

Originally, the February meeting was going to be when the staff would come together to arrive at final recommendations, planning for the second semester of instruction, and drafting up implementation needs and support for installing the selected program in the fall of 2022. However, the work of the original January and February sessions would need to be compacted into the February meeting. Ideally the team would come to a unified decision at this point.

During the February meeting, the team synthesized all the data collected on the three programs which were deeply explored during Year's 1 and 2 of their curriculum review process. The data considered spanned a variety of sources, including but not limited to; interviews, student, staff and family surveys, state and district evaluations of the resources, third-party efficacy reports, implementation evaluations, and reflections of each program through the lens of the K-12 Science Instructional Materials Criteria.

As the February meeting time neared ending, a proposal was offered for considering Elevate as the direction of our team. While there were some differences of opinion about some parts of this proposal, all the staff members shared that they had no significant issue for that decision. However, the team had spent over 100 hours each already working through this review process, so as a group we decided to send the staff back to let them talk at their buildings and with their colleagues about this proposal, and the team could meet one last time to finalize their recommendation. As the team left the February meeting, they were tasked with considering these specific questions;

- What would you want to make sure our team considers should we continue to identify Elevate as our direction as a team?
- What would you want and need to be a champion in that direction?
- What do you think we need as a team to be able to champion this direction collectively and collegially?

The team reconvened one last time, in April 2022, to arrive at a final recommendation on which program to select, as well as discuss their needs and plans for installation beginning in the fall of 2022. As a reminder, the team had formerly

been reviewing three programs, Amplify Science, Elevate Science, and Inspire Science, and ideally they were to identify one program collectively for grades 5-8. Therefore, after a deep and intentional review process, the committee decided there was enough information to bring forward a unified materials adoption recommendation for Elevate Science in grades 5-8.

The main aspects of this recommendation are noted below.

- **In terms of integration with Canvas, Elevate had both the best interface of the three currently, and the improvements that could be gained already** (going through Canvas browser for instance to improve integration) as well as the benefits that are coming, were above and beyond the other two programs.
- **The lab experiences in Elevate included both virtual simulations and physical hands-on activities, and the hands-on activities surpassed those of the other two programs**, both in terms of quantity and quality. The labs were more modernized, hands-on, and inquiry-based.
- **Of the three programs, Elevate was by far the most customizable set of resources**, which provides our team with the benefit of being able to take the best of what was already a strong science approach before, and blending those with the new improvements found within the Elevate resources. The other programs, particularly Amplify, required a strong level of fidelity to follow the entire program, which all but eliminates the customization that our team needs.
- **Of the three programs, Elevate was as strong or stronger than the other two in terms of what is perceived as preparing students for their high school experiences in science.**
- **The Elevate resources, while imperfect in this area still, were intentional about representing diverse perspectives and representations in both the materials and experiences of the lessons**, whereas some of the other programs used animations, animals, and avatars mostly to represent students and people of diverse backgrounds.
- **The intention of creating instruction around modeling, three-dimensional teaching, and phenomena-based learning, was noticeable in the Elevate resources.** There is enough structure in those approaches provided for our team to take what is there and customize it for our students' backgrounds and experiences in our middle schools. The inquiry aspect within the learning experiences in Elevate was as strong as or stronger than the other two programs.
- **The readability of the Elevate resources provided a better fit** in terms of balance for students given both the lexile ranges provided, as well as the amount of requisite reading that is needed to participate in the learning of the science involved.

**Additionally, the team identified aspects which will need further consideration and support include;**

- Balancing the customization of the resources with building a connected learning experience
- Closer inspection of the assessments to ensure they align with the instruction we will develop
- Explore the benefits and costs of moving to browser-based Canvas integration (rather than app)
- Develop a cost effective and efficient way to order and inventory manipulatives for the increase in labs
- Bringing any remaining staff into the training and planning process
- With a decision on resources finalized, shifting attention back to pedagogy shifts in new standards
- Finalize a timeline for shifts to using new resources and updated scope/sequences in each grade
- Development of common scope and sequences between middle schools
- Development of common assessments between middle schools
- Refocusing attention on authentically integrating our American Indian standards into the curriculum
- Developing modifications for our students based on a variety of factors including language.
- Revisiting and updating Dodge Nature Center's experiences within the new curriculum
- Considerations on how to maintain, add, or redefine other partnerships (e.g., College of Biological Sci)

Now that the team has a unified recommendation to move forward, in terms of a core program, they would begin the work of preparing for installation, implementation, and mapping out a timeline to sustainability of implementation, all of which begins with their second round of summer Training Academy sessions, which were held during the summer of 2022.

## High School Curriculum Review Update

The high school curriculum review team began their restart on the process in May of 2022. While the pandemic certainly had an impact on the work that the district and staff were able to accomplish since March of 2020, there are other issues that create the need to have a more timid pace with the high school review process. One of these issues is the amount of turnover that the high science team has had since the beginning of their review process in fall of 2019.

- 2019-2020 Year 1 - By the end of 2019, members of the original review team had already moved elsewhere
- 2020-2021 Year 2 - Only one meeting, and it was virtual, and focused on one main topic (course sequence)
- 2021-2022 Year 2 - By now, more than 33% of the team was not part of either year's (19-20 or 20-21)
- 2022-2023 Year 2 (still) - Going into the fall of 2022, more than 50% of our team has turned over since 2019.

Therefore, a large majority of the work that the team began in May of 2022, which was the first department-wide meeting since 2020, was to revisit foundational topics and create plans for future work. However, we also recognized the need to double down on the work and move as expeditiously as possible, so that the team can meet the implementation deadline of fall 2024. While fall of 2024 seems far away, there is still plenty of work that needs to be accomplished in a way that aligns with the staggered approach that is needed to meet the state's expectations.

The high school review team hastened its pace beginning in July, 2022, as they started the work using the Training Academy approach for professional development. The Training Academy approach provides staff with up to 18 hours of meeting, planning and support time, which results in essentially three, six-hour sessions across the summer. The first of these sessions was on July 19th.

Prior to July 19th, a small group of teachers began some early work on the Earth and Space Science course that will be offered in 9th grade, and on July 19th, they shared an update with the team. While a significant amount of work remains for the 9th grade team on this course, it was clear from this first update that an incredible amount of work had been accomplished. High level organization of potentially six units, ranging from units focusing on how planets are born, to how access to potable water resources impact human societies, economies, and political systems, to topics related to climate change and sustainability, were created and shared. As stated earlier, plenty of work remains for the 9th grade team, however, it is clear that the course is well on its way to not only meeting the state requirements in standards, it also looks as if it will be highly engaging for students, relevant to today's world, and plenty of opportunities to authentically integrate concepts of race, ethnicity, social justice, and American Indian education.

The remainder of the work in July of 2022 focused on;

- developing a course sequence that was ready for and initial review and discussion with building and district administration,
- the very earliest stages of reviewing materials,
- discussing potential elective course options,
- and starting the work of integrating the 2019 standards into their current courses where possible while

highlighting what will need to change to fully meet the practices, cross-cutting concepts, and core ideas of the state standards.

The team's second meeting was held on August 1st, and the three biggest areas of focus included;

- Updates from courses on their progress of integrating where possible the core ideas of the standards and opportunities for the department to provide input on their progress to date
- Revisiting the concepts of phenomena-based instruction and begin brainstorming ideas of storylines for units
- A continuation of their early stages of materials review
- And ending in further time for course-level teams to continue developing their individual course scope and sequences.

The team's third meeting, which is to be conducted asynchronously, is to continue working on developing the individual course scope and sequences as well as ways in which they can integrate the concepts of phenomena and storylines into the unit development. This work will not have been fully completed before the anticipated date for sharing this board report, therefore, updates to this work will be included in future board updates on this curriculum review process.

The team will continue to work on aspects of the curriculum review throughout the 2022 - 2023 school year as well as the summer of 2023. This work includes;

- Updating the high school course sequence, including elective options and advanced course opportunities
- Formally reviewing instructional materials for applicable courses, and potentially making recommendations by spring of 2023
- Further development and refinement of science courses to authentically integrate the practices, cross-cutting concepts, and core ideas of the 2019 state standards
- Creating, and regularly updating, course level scope and sequences
- Participating in professional growth opportunities as needed in any of the areas listed above

### Educational Equity Analysis / Four Way Equity Test

Throughout the entire curriculum review process, the team is charged with routinely asking how the questions included in the Four Way Equity Test could be used to address findings from each particular stage in the review process. Examples for how this work was integrated throughout the process are noted below.

For reference, the 4- Way Equity Test questions are provided below as well.

1. Does this help to provide opportunities for students who have historically been underserved, underrepresented, or disadvantaged by the current system?
2. Does this help to ensure equitable access for all?
3. Does this help to eliminate barriers based on gender, race/ethnicity, national origin, color, disability, age or other protected group?
4. Does this ensure the same rigorous standards for academic performance exist for all students?

Specific Areas to Address in Year 1 Four-Way Equity Test	Examples of evidence from within the review process
Incorporate culturally inclusive pedagogy and resources in Science curriculum	<b>Connections between core science resources and American Indian standards.</b> As the team begins using the

	<p>selected core resources, one of the ongoing focus areas will be to see where overlaps with our states' American Indian standards in science exist with the resources they are using.</p> <p><b>Partnerships with Dodge Nature Center.</b> Several opportunities for integrating American Indian histories and perspectives into how and what students learn about science are found in the various activities that Dodge Nature Center engages our students with.</p> <p><b>Acquiring resources to review and potentially use.</b> In collaboration with the American Indian Education liaison, five foundational resources were purchased for the team to use as reference points.</p>
<p>Including more students' voice and choice within the curriculum.</p>	<p>Classroom teachers and science specialists at the K-4 level will work together to create a collaborative teaching model that will provide experiences in both science and in the homeroom via cross curricular connections (i.e. providing science readers during independent reading time, writing projects connected to an animal unit etc). All students will have hands-on experiences during science instruction. Supporting reading and writing activities would happen outside of science class.</p> <p>Included within each middle school scope and sequence document is an area for explicitly connecting the content of the course with student perspectives and input. This will be an ongoing and iterative topic throughout the planning process.</p>
<p>Creating a more consistent Science program between all elementary and middle schools.</p>	<p>Decisions on instructional materials, scope and sequences, and assessments are being made collaboratively across grades and sites. Each course and grade level will have a unified approach to what they teach, resources they use to teach the course, and how they plan on assessing student learning.</p>
<p>Teachers were clear about the need for updated resources, including materials to match their students' needs, backgrounds, reading levels and interests.</p>	<p>Inspire Science provides science careers and representations of scientists from a variety of backgrounds and lived experiences.</p> <p>The Elevate resources were intentional about representing diverse perspectives and representations in both the materials and experiences of the lessons, whereas some of the other programs used animations, animals, and avatars mostly to represent students and people of diverse backgrounds.</p>

College credit bearing opportunities, such as Advanced Placement (AP) and College in the Schools (CIS) courses are not an accurate representation of the district's student population.

Course prerequisites for higher level science courses may be prohibiting some students from enrolling in them, such as the 9th grade Pre-AP Science course, which has specific math course prerequisites that not all our students are able to complete before 9th grade.

This was a focus of professional development in 2021-2022, as well as a cornerstone part of the Rigorous Coursework Grant that the district was awarded.

Early evidence of how professional development impacted disparities in advanced courses is demonstrated below, which compares the enrollment of our students of color for advanced courses in science in 2021/22 and course requests for 2022/23.

	Fall 2021	Fall 2022	Difference
PreAP Science	30.5%	36.5%	+6.0%
AP Biology	21.1%	30.7%	+9.6%
AP Chemistry	11.8%	19.9%	+8.1%
AP Physics - Mech	17.6%	27.2%	+9.6%
CIS Physics/Inquiry	42.7%	59.4%	+16.6%
CIS Intro to Physics	22%	19.6%	-2.4%

### Elementary (Kindergarten through Grade 4)

- Continued collaborative planning for science instruction (creation of common scope and sequence).
- Implementation of new Inspire Science resources in Science specialist classes as well as homeroom classrooms.
- Develop and review common assessments for all K-4 science standards.
- Time on professional development days for teachers to collaborate on the new science material implementation.
- Ensure time in science is focused on hands-on experiences with phenomena.
- Continued review of Dodge field trips by grade level and how they align with new MN Science standards.
- Continuing to focus attention on authentically integrating our American Indian standards into the curriculum
- Meet with science specialists each quarter to review where we are with implementation and make adjustments as necessary.

### Middle School

- Balancing the customization of the resources with building a connected learning experience
- Closer inspection of the assessments to ensure they align with the instruction we will develop
- Explore the benefits and costs of moving to browser-based Canvas integration (rather than app)
- Develop a cost effective and efficient way to order and inventory manipulatives for the increase in labs
- Bringing any remaining staff into the training and planning process
- With a decision on resources finalized, shifting attention back to pedagogy shifts in new standards
- Finalize a timeline for shifts to using new resources and updated scope/sequences in each grade
- Development of common scope and sequences between middle schools
- Development of common assessments between middle schools
- Continuing to focus attention on authentically integrating our American Indian standards into the curriculum
- Developing modifications for students based on a variety of factors including language.
- Revisiting and updating Dodge Nature Center's experiences within the new curriculum
- Considerations on how to maintain, add, or redefine other partnerships (e.g., College of Biological Sci)

### High School

- Identifying how to integrate the Earth and Space science standards into a new and required course in 9th grade
- Identifying gaps and overlaps between the 2009 and 2019 science standards in all required courses, and begin to update curriculum plans in each to match the new standards
- An updated scope & sequence pathway at the high school to reflect new state standards and requirements
- Participating in the review process of instructional materials for required courses
- Deepening their knowledge of phenomena-based instruction and three-dimensional learning
- Developing an implementation plan to ensure students will be prepared for the Spring 2025 MCA-IV in Science.
- Continue to identify strategies for reducing/eliminating disparities in advanced coursework opportunities
- Explore possibilities for additional elective course offerings, as well as expanding advanced course options.



## Appendix A: K-12 Science Review Team

K- 12 Review Team		
Team Member	Title	Site
Anne Bolsem	Kindergarten Teacher	Garlough Environmental Magnet School
Courtney Korpela	Kindergarten Teacher (Grade K Pilot)	Somerset Elementary
Kalin Farrell	First Grade Teacher	Moreland Arts and Health Sciences Magnet School
Kim Benton	iNature Teacher (Grade 1 Pilot)	Garlough Environmental Magnet School
Julia Poppitz	Second Grade Teacher	Mendota Elementary
Caroline Beattie	STEAM Teacher (Grade 2 Pilot)	Moreland Arts and Health Sciences Magnet School
Ryan Schmitt	Third Grade Teacher	Pilot Knob STEM Magnet School
Matt Beniak	STEM Teacher (Grade 3 Pilot)	Pilot Knob STEM Magnet School
Megan Tulia	Fourth Grade Teacher	Somerset Elementary
Thomas Schwister	Fourth Grade Teacher (Grade 4 Pilot)	Mendota Elementary
Amanda Mahlstedt	Grade 6 Earth and Space Science Teacher	Friendly Hills Middle School
Brianna Havir	Gr 7/ 8 Earth, Space, Life Science Teacher	Heritage E-STEM Middle School
Crystal Mielke	Grade 7 Life Science Teacher	Friendly Hills Middle School
Kristin Dirksen	Grade 5 Science Teacher	Heritage E-STEM Middle School
Leigh Danner	Grade 5 Science Teacher	Heritage E-STEM Middle School
Patrick McCormick	Gr 7/ 8 Earth, Space, Life Science Teacher	Friendly Hills Middle School
Terry Doud	Gr 7/ 8 Earth, Space, Life Science Teacher	Heritage E-STEM Middle School
Katy Lynch	Grade 6 Earth and Space Science Teacher	Friendly Hills Middle School
Charlie Hiti	Grade 5 Science Teacher	Friendly Hills Middle School
Dan Reed	Grade 8 Earth and Space Science Teacher	Friendly Hills Middle School
Greg Westendorf	Grade 6 Earth and Space Science Teacher	Heritage E-STEM Middle School
Isaiah Schmidt	Gr 7/ 8 Earth, Space, Life Science Teacher	Heritage E-STEM Middle School

Jason Tabaka	Grades 7 and 8 Science Teacher	Heritage E-STEM Middle School
Tom Schlehuber	Gr 7/ 8 Earth, Space, Life Science Teacher	Heritage E-STEM Middle School
Eric Friberg	Life Science Teacher	Two Rivers High School
Jen Nippert	Life Science Teacher	Two Rivers High School
Sara Peterson	Life Science Teacher	Two Rivers High School
Marcie Lapointe	Life Science Teacher	Two Rivers High School
Patrick Killian	Earth and Space Science Teacher	Two Rivers High School
Eugenia Cegla	Earth and Space Science Teacher	Two Rivers High School
Sam Heupel	Physical Science Teacher	Two Rivers High School
Sandi Cooper	Physical Science Teacher	Two Rivers High School
Marc Tobias	Physical Science Teacher	Two Rivers High School
Jen Clem	Physical Science Teacher	Two Rivers High School
Paul Good	Physical Science Teacher	Two Rivers High School
Elizabeth Howatt	Physical Science Teacher	Two Rivers High School
Peter Bohacek	Physical Science Teacher	Two Rivers High School
Laura Scott	Life Skills Science Teacher	Two Rivers High School
Mark Quinn	Principal	Moreland Elementary
Chris Hiti	Principal	Friendly Hills Middle School
Al Johnson	Principal	Two Rivers High School
Miles Lawson	Secondary Curriculum & Gifted & Talented Coordinator	School District 197
Jennifer Miller	Special Education Coordinator	School District 197
Kate Skappel	Elementary Curriculum and Gifted and Talented Coordinator	School District 197
Andrea Saenz	ESL Coordinator	School District 197
Cari Jo Drewitz	Director of Curriculum, Instruction and Assessment	School District 197

## K-12 Science Instructional Materials Criteria Template

Program	Grade	Reviewer

### Culturally Inclusivity / Contribution

- Represents various experiences (such as: race, culture, disability status, gender, sexuality, age, socioeconomic status, etc)
  - Are males and females included in equal numbers?
  - Are individuals with disabilities depicted in active roles?
  - Have older, middle-aged, and younger characters been included?
  - Are people of different income levels (socioeconomic) included?
  - Are different types of family structures (two-parent, one parent, extended family, same-sex, etc.) included?
- Diverse points of view
- Stereotyping is avoided
- Groups and individuals represented in a balanced and realistic manner
- Existence of bias, privilege, sexism, racism, etc. are acknowledged
- Language is unbiased
- Does this selection provide an important or necessary contribution to the whole selection of resources?

### Interest Level

- Does the material reflect the experiences/perspectives/backgrounds of our student population?
- Are the lessons and units authentically engaging students in learning about science concepts?

### Minnesota Standards Aligned

- Aligned with state standards and the MCA-IV test specifications
- Activities and assessments provide students with opportunities that align with how MCA-IV items are developed and assessed
- Lessons and units provide appropriate levels of flexibility within scope and sequence

### Accessibility

- Available in multiple languages?
- Available in multiple formats?

### Digital tools and integration

- What options are available for integration with Canvas?
- Which devices are compatible w/digital resources, and to what extent?
- Availability of technology-enhanced resources
- Are lessons, activities, resources available online and offline?
- What types of technology supports are available?
- Are there engaging and effective virtual labs or simulations available?

### **Appropriateness/Readiness**

- Maturity level
- Language / violence / sexuality
- Vocabulary / Lexile range

**Three-Dimensional Learning:** The materials are designed so students make sense of phenomena and/or design solutions to problems by engaging in student performances that integrate the three dimensions of the MN state standards.

- Explaining Phenomena/Designing Solutions: Making sense of phenomena and/or designing solutions to a problem drive student learning
- Three Dimensions: Builds understanding of multiple grades-appropriate elements of the practices, disciplinary core ideas, and crosscutting concepts that are deliberately selected to aid students' sense-making of phenomena and/or designing of solutions.
- Integrating the Three Dimensions: Student sense-making of phenomena and/or designing of solutions requires student performances that integrate elements of the SEPs, CCCs, and DCIs

**Instructional Supports:** The lesson/unit supports three-dimensional teaching and learning for ALL students by placing the lesson in a sequence of learning for all three dimensions and providing support for teachers to engage all students.

- Relevance and Authenticity: Engages students in authentic and meaningful scenarios that reflect the practice of science and engineering as experienced in the real world.
- Student Ideas: Provides opportunities for students to express, clarify, justify, interpret, and represent their ideas and to respond to peer and teacher feedback orally and/or in written form as appropriate.
- Building Progressions: Identifies and builds on students' prior learning in all three dimensions.
- Scientific Accuracy: Uses scientifically accurate and grade-appropriate scientific information, phenomena, and representations to support students' three-dimensional learning.
- Differentiated Instruction: Provides guidance for teachers to support differentiated instruction by including:
  - Appropriate reading, writing, listening, speaking supports
  - Extra support (e.g., phenomena, representations, tasks) for students who are struggling to meet expectations.
  - Extensions for students with high interest or who have already met expectations to develop deeper understanding of the practices, disciplinary core ideas, and crosscutting concepts.

**Monitoring NGSS Student Progress (lessons and units):** The materials support monitoring student progress in all three dimensions of the MN state standards as students make sense of phenomena and/or design solutions to problems.

- Monitoring 3D student performances: Elicits direct, observable evidence of three-dimensional learning; students are using practices with core ideas and crosscutting concepts to make sense of phenomena and/or to design solutions.
- Formative: Embeds formative assessment processes throughout that evaluate student learning to inform instruction.
- Scoring guidance: Includes aligned rubrics and scoring guidelines that provide guidance for interpreting student performance along the three dimensions to support teachers in (a) planning instruction and (b) providing ongoing feedback to students.
- Unbiased tasks/items: Assesses student proficiency using methods, vocabulary, representations, and examples that are accessible and unbiased for all students.
- Coherent Assessment system: Includes preassessments,, formative, summative, and self-assessment measures that assess three-dimensional learning.
- Opportunity to learn: Provides multiple opportunities for students to demonstrate performance of practices connected with the understanding of disciplinary core ideas and crosscutting concepts and receive feedback.