Science Standards Information and Summary:

Information and Summary:

The state of Minnesota has adopted new standards for Science that seek for full implementation by the 2024-25 school year. Minnesota was one of several states that worked to develop a set of national science standards entitled *Next Generation Science Standards* (NGSS) and released in 2013. Forty-four states have adopted or used NGSS as a framework to build their state standards. Minnesota is one of the states that adapted the NGSS in order to create the approved Minnesota Science Standards. NGSS is predicated on three dimensions of learning science. Each standard utilizes one component of each dimension to create the performance expectations for students. The dimensions are combined to form each standard and they work together to help students build a cohesive understanding of science over time.

The three dimensions are:

- cross cutting concepts (framework for scientific thinking across disciplines)
- science and engineering practices (standard behaviors that scientists and engineers use to explain the world or solve problems)
- disciplinary core ideas (fundamental scientific knowledge)

An important goal of three-dimensional science teaching is for students to approach science through a phenomena that provides pathways for students to engage in inquiry and problem solving. The organization of the Minnesota standards reflect the interconnectedness of science with an integration of the three dimensions.

A phenomena refers to observable events that occur in the universe that we can use science knowledge to explain or predict. Engineering involves designing solutions to problems that arise from phenomena, and using explanations of phenomena to design solutions. By centering science education on phenomena, the focus shifts from learning about a topic to figuring out why or how something happens.

Science Curriculum Review Process Update:

Design Team Background

The Elementary Science Review Team began its initial work in the 2018-2019 school year. The team included representatives from each elementary building and each grade level. Due to the length of the process there was some turn over in members. A list of design team representatives throughout the process is provided for reference purposes.

Kristin Greene - Cornelia/Teaching and Learning, Mark Carlson - Teaching and Learning, Isa Punchard - Teaching and Learning, Leah Bulver - Highlands, Katie Stengel - Normandale, Cathy Williams - Creek Valley, Alyssa Barnes - Countryside, Britt Theis - Creek Valley, Michael Smith - Cornelia, Bill Wiard - Countryside, Allison Knoph - Concord, Cara Rieckenberg (Consultant) - Highlands

This process has been challenging as it was interrupted beginning in the spring of 2020 and did not meet during the 2020-21 school year. This break was due to health concerns, lack of resources, and capacity of members during the pandemic. The team has been following the Curriculum Review Process.

Prior to the 2019 final approval of the Minnesota State Science Standards, the team was able to get initial drafts of the standards and process the changes from the previous version. As part of the process the team met with Science Design Teams from the secondary level to develop a Guiding Change Document. The team did some gap analysis around prior standards and new standards. The old standards were more about content students should know and processes they should be able to do while the new standards provide a set of performance expectations that integrate practices, core ideas and cross-cutting concepts. The new standards build on students' prior knowledge and experience as students' science is deeply grounded in personal experiences. The team concluded the focus of the standards had changed completely and therefore our K-5 program must as well.

Program Design:

The team decided, to meet the demands of the new standards, the new science program must allow students to be the creators of their learning. Science should be phenomena based to tap into a student's natural desire to make sense of the world. This type of learning begins by asking a question about the world around them. This approach allows students to find relevance and to make connections. To implement the new standards well there is a need for:

- a greater emphasis on an inquiry approach to science.
- learning to occur across all four science disciplines (physical, life, earth and space, and engineering).
- a three dimensional approach to help students make connections.

Another factor impacting the work of this committee was the need to ensure that science could be taught using a cross curricular approach. This was articulated in the Guiding Change document but became a point of greater emphasis as Edina began working towards STEAM programming at the elementary level. The term STEAM stands for science, technology, engineering, arts and mathematics. This approach requires resources to have flexibility to be used in the creation and extension of lessons and projects that could incorporate STEAM. The team determined that the science standards can serve as the backbone for this work and therefore needed materials to support these efforts.

Material Review

Once the team determined what the Science program design needs were, the next step in the process was to determine what resources could be used to deliver these new standards. They then developed a Science Materials Selection Rubric for selecting core materials. Materials from several publishers and providers were gathered for evaluation by the Design Team. The rubric guided the evaluation and group discussions around each product. The team then developed a pros and cons list for each of the products to help synthesize product evaluation. Finally, they chose two finalists which they planned to explore further with students for the fall of the 2020-21 school year. The two finalists were Amplify Science published by Amplify Education and TCI Elementary Science Curriculum published by TCI. This decision was made mid-March of 2020 right before in-person school closed for the year.

The team did not meet again until October of 2021. After several meetings exploring expected performance outcomes at each grade level, the team reexamined the work they did around materials. Upon further review, they determined Mystery Science by Discovery Education had made significant changes to meet the needs of teachers during the Pandemic and they determined it needed to be a finalist as the changes addressed the initial concerns. At the same time, they determined that TCI would not be a good fit for Edina teachers and students.

In the fall of 2022, EPS was provided materials from Amplify Science for the Design Team to do some action research. In addition, Mystery Science provided Edina Public Schools access to the online components of all of their materials for all students in grades K-5. Each design team member started by using the Mystery Science materials with students in the fall, to see how the

materials worked with students. These teachers also started doing some planning and closer examination of how they would teach with the Amplify materials.

The plan was to have teachers use Amplify Science with students prior to the end of November. At our fall Design team meeting the team made the decision that Amplify was not going to be a good fit for several reasons. A key area of concern centered around its lack of flexibility. It would be difficult to use as a resource as EPS continues to expand our STEAM programming at the K-5 level. The team unanimously agreed, after already using Mystery Science, that Amplify was not as good a fit as Mystery Science.

Elementary Science Materials Information Gathering:

Design Team members worked with the Amplify and Mystery Science materials, engaged in conversations with their grade level team members, and then discussed as a team the pros and cons of the materials and their experiences. The information shared was captured in a table organized as pros and cons.

Amplify Science:

Pros	Cons
● Large, organized bank of resources ● Resources are thorough and align with NGSS ● Ongoing customer support and help ● Science content is strong ● Videos are engaging ● High literacy component ● Spanish available	● Teacher manual heavy; Very overwhelming for teachers. ● Not intuitive or user friendly. ● Curriculum requires more time than we have; 22 lessons in 4 units; we'd never realistically be able to do that many units due to elementary schedules. ● Felt clumsy; not a smooth flow. ● Includes units that are not required per MN Standards; paying for unused components. ● The curriculum resources did not feel different enough than traditional science instruction. As we learn about NGSS and the spirit of 3 dimensional learning, the lessons really should look and feel different. ● Limited flexibility to modify, change or alter scope & sequence. ● Highly scripted and little room for flexibility.

Mystery Science

Pros	Cons
● High student and teacher engagement ● Aligned with NGSS standards ● Anchor phenomena bookends each unit (New add) ● Very user friendly ● Covers all MN standards by following grade level units as designed by Mystery Science with minimal exceptions ● Everything is there, created and ready to go ● Mystery packs provide all materials needed ● Clear structure ● Strong organization ● Resources are constantly being updated and are never outdated due to digital content. ● Spanish Available ● User friendly and engaging for new and veteran teachers. ● Students and teachers love it ● Is based on questions and inquiry ● Three dimensional lessons throughout (science/engineering practices, cross cutting concepts, core ideas) ● Has a lot of printables if desired ● science notebook approach can be incorporated ● Various options to go deeper ● Good base for the development of STEAM units ● Includes links to read-alongs ● Strong customer service ● Strong real world connections ● Free online access for educators for literacy content through Mystery Science, Epic, Newsela, and ReadWorks ● Literacy sources offer strong vocabulary strategies and opportunities for practice and application ● Literacy components are able to be: printed, downloaded, read to students (by teacher or computer), presented on a large screen, adjusted based on student reading level and/or accessed in spanish.	● Fewer books in kids' hands ● Need a plan for Mystery Packs because gathering supplies is too much to ask of teachers ● Need to replace consumables

Other Districts

There are several neighboring school districts that have adopted Mystery Science as their core curricular materials or use it as a resource. Districts who have adopted Mystery Science include Wayzata, Bloomington, Hopkins, St. Louis Park, Minnetonka and Richfield. In addition many other metro districts use this resource including Mounds View, Mahtomedi, Lakeville and Eastern Carver County. Finally, many other districts are in a similar place to Edina and are also considering Mystery Science for adoption. Beyond Minnesota, this is a resource that has been widely adopted across the country, including Chicago Public Schools.

K-5 Science Curriculum Adoption Recommendation: Mystery Science

General Overview:

We find ourselves in an unprecedented time. Schools are not what they were a few years ago. Science is a dynamic content area where standards and curriculum are simultaneously changing as we navigate new ways to interact with and engage students. In learning to do both at the same time, Mystery Science has provided teachers with a solid outline of content as well as tools to engage students with vibrant videos, online texts, hands on demonstrations, and an online platform to record their claims, evidence and reasoning as they pursue new knowledge.

The creation of Mystery Science is informed by decades of educational research on how kids develop a conceptual understanding of science and learn to reason scientifically. In particular, the following three findings from educational research are core to the design of lessons:

- Student interest and engagement enables learning.
- Students' prior knowledge is an important resource, and conceptual understanding supports deeper reasoning about a topic.
- Scientific discourse facilitates conceptual development.

Mystery Science provides well established storylines to guide student learning. The storylines start with an anchor phenomenon to inspire curiosity in students. Per the Next Generation Science Standards, units are based on a 3-dimensional framework of disciplinary core ideas, cross-cutting concepts and science and engineering practices. Mystery Science incorporates all three of these in each unit and cohesively builds on itself. Students regularly revisit the phenomenon while building their knowledge until students can explain the phenomenon.

Mystery Science units include a strong literacy component by utilizing online texts that can be easily accessed through their own site as well as Epic, Newsela and ReadWorks. These texts can be adjusted based on students' reading levels. The texts can be printed or presented on the screen. They have an audio component for students to listen to the text being read to them. The literacy pieces include a strong vocabulary component offering opportunities to practice and apply newly learned scientific language and concepts. Texts and practice opportunities can also be accessed in spanish.

Particular highlights of the program include captivating videos and real world connections for students to understand science concepts. The units are age-appropriate and accessible to both teachers and students. Mystery Science offers a multi-faceted approach to learning. Videos,

stories, art projects, and hands-on learning get the students engaged and participating in learning ideas that are current and meaningful. Students can apply what they are learning to real-world situations. The inquiry based learning that Mystery Science offers encourages all students to participate and share ideas. The "See-Think-Wonder" charts give students the opportunity to explore the world of science without feeling confined.

Mystery Science is a digital based platform that allows it to be easily incorporated into many aspects of student learning. Teachers have benefited from a great support staff at Mystery Science that is ready at a moment's notice to answer specific questions teachers may have. Mystery Science is compatible with SeeSaw and Schoology which allows for streamlined integration into daily lessons. Teachers can easily post materials from Mystery Science for students to access, while also having the additional bonus of having a program that can communicate directly with our learner management systems, which is a time saving process. Mystery Science will be able to update their information in real time because it is an online based platform, something a textbook based platform would not be able to do. For a discipline such as science, this is a huge benefit, helping make sure we are exploring the most accurate information and thinking with our students.

For a short Mystery Science overview visit:
https://mysteryscience.com/

Next Steps:

In acknowledging the many positive data points that support the adoption of Mystery Science, there are additional steps to take to ensure an implementation that defines excellence. These steps include:

1. Continued Professional Development and support on implementation of the instructional shifts that Mystery Science and the new MN State Standards bring.
2. Continue to support the adaptation of resources already in French and fill additional needs with free lesson resources in French for Normandale.
3. Ongoing support for Normandale for consumable resources.
4. Targeted Professional Development on Mystery Science and the many components of the curriculum that will benefit all Edina elementary students if understood and supported.
5. Development of a systemic approach to consumable materials such that teachers have the necessary resources for lessons each year. Replacement of necessary materials will be approximately 5-15% of the original cost of the Mystery Packs each year.

We are currently positioned to move forward with each of these steps and our Edina Elementary teachers are ready to move forward with the Mystery Science adoption at this time. Mystery Science has proven to meet the standards, as well as the needs of our Edina learners.

Appendix I
Mystery Science Adoption Preliminary Budget

Item	**Cost**
Site License for 5 sites for 8 years	$51,800
Mystery Packs for 22 Kindergarten Classrooms	$7040
Mystery Packs for 22 1st Grade Classrooms	$7040
Mystery Packs for 21 2nd Grade Classrooms	$9030
Mystery Packs for 21 3rd Grade Grade Classrooms	$9030
Mystery Packs for 21 4th Grade Classrooms	$9030
Mystery Packs for 21 5th Grade Classrooms	$9030
Normandale Supplies	$9000
Normandale Curriculum Writing	$6000
Total	**$117,000**