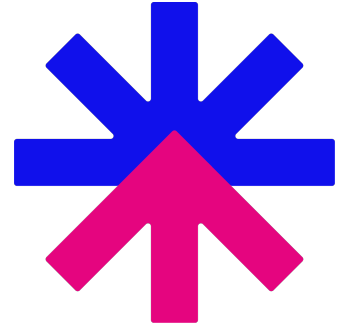




Medtronic Spark Explore Teacher Guide

Exploring Healthcare Innovation & Inspiring Future Innovators

Middle School Grades 5-9

Learning Undeclared in partnership with Medtronic

Curiosity inspires exploration. Exploration drives innovation. Innovation improves lives.

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Welcome to the Medtronic Spark Explore Experience

Every innovation begins with curiosity.

Every day, people ask questions that lead to meaningful discoveries.

What if we could improve a patient's quality of life?

What if we could solve a complex healthcare challenge?

What if today's students became tomorrow's innovators?

Medtronic Spark Explore invites students to investigate authentic healthcare challenges through an immersive learning experience that connects science, engineering, collaboration, and curiosity. Throughout the experience, students explore how biomedical engineering and healthcare technology contribute to improving patient outcomes while discovering the power of innovative thinking.

Educators are essential to that journey.

By preparing students before their visit, supporting them during the experience, and extending learning afterward, educators help transform one day of exploration into lasting understanding.

Thank you for partnering with Learning Undeclared and Medtronic to inspire curiosity, encourage exploration, and help students discover new possibilities for their future.

If you have any questions, please contact Amanda Asher, Education Program Manager (amanda@learningundefeated.org, 210-464-7071).

Innovator Note

Students are not expected to arrive with all the answers.

Medtronic Spark Explore is designed to encourage students to ask thoughtful questions, investigate ideas, and discover how innovation begins through exploration.

Why Medtronic Spark Explore?

Healthcare innovation begins with people who are curious enough to ask, "What if?"

Medtronic Spark Explore connects classroom learning with authentic applications of biomedical engineering, healthcare technology, and engineering design through an immersive instructional experience.

Students investigate real-world healthcare challenges while strengthening the skills that support success in school, future careers, and lifelong learning.

Throughout the experience, students are encouraged to:

- Explore biomedical engineering and healthcare technology.
- Apply the engineering design process.
- Analyze evidence and make informed decisions.
- Collaborate as engineering teams.
- Strengthen communication and critical thinking skills.
- Discover future opportunities in health technology, biomedical engineering, and healthcare innovation.

Rather than focusing on memorizing information, Medtronic Spark Explore encourages students to explore ideas, collaborate with others, and experience how innovation can improve lives.

Classroom Connection

Medtronic Spark Explore complements classroom instruction by connecting academic concepts to authentic engineering challenges and future career pathways.

Program at a Glance

Program Element	Overview
Grade Levels	5-9 (<i>Designed for students in grades 6-8, and select grade 5 & 9 students attending middle schools where the program is implemented</i>)
Experience Length	Approximately 35-45 minutes
Learning Environment	Mobile Learning Vehicle, a 53-foot trailer
Student Group Size	Maximum of 36 students
Instructional Focus	Biomedical Engineering • Healthcare Technology • Engineering Design • Innovation
Student Experience	Collaborative engineering investigation centered on an authentic healthcare challenge

Students Will...

- Investigate an authentic healthcare challenge.
 - Explore biomedical engineering concepts.
 - Collaborate as engineering teams.
 - Analyze evidence and test ideas.
 - Reflect on how innovation can improve lives.
 - Discover future opportunities in health technology, biomedical engineering, and healthcare innovation.
-

Good to Know

Medtronic Spark Explore is one part of a complete instructional experience that includes classroom preparation, an immersive mobile laboratory experience, and post-visit reflection.

The Medtronic Spark Explore Learning Journey

Meaningful learning extends beyond a single day.

The Medtronic Spark Explore instructional experience is intentionally designed to support learning before, during, and after the mobile laboratory visit.

PREPARE

Required Pre-Lab Curriculum

Teacher Planning

Student Readiness



EXPLORE

Medtronic Spark Explore Mobile Experience



REFLECT

Required Post-Lab Curriculum

Classroom Discussion



EXTEND

Innovation Challenges

Career Exploration

Real-World Connections



CELEBRATE

Teacher & Student Surveys

Educator Certificate of Completion (5 hours)

Continued STEM Exploration

Why It Matters

Students benefit most when classroom preparation, immersive learning, and post-visit reflection work together as one connected instructional experience.

Before Your Visit

Thoughtful preparation creates the foundation for a meaningful experience.

Preparing students before the vehicle visit helps them arrive ready to participate with confidence and curiosity.

REQUIRED BEFORE YOUR VISIT

- ☐ Review the Educator Guide.
 - ☐ Complete the required Pre-Lab Curriculum.
 - ☐ Attend the virtual pre-visit meeting.
 - ☐ Submit student accessibility and accommodation needs.
 - ☐ Confirm your classroom schedule.
 - ☐ Submit required online documents through the Medtronic Spark Explore Resource Hub.
 - ☐ Introduce key vocabulary and foundational concepts.
 - ☐ Encourage students to arrive ready to explore, collaborate, and ask questions.
-

Required

Completion of the Pre-Lab Curriculum is required prior to your scheduled Medtronic Spark Explore visit.

Innovator Tip

The purpose of the Pre-Lab Curriculum is not to prepare students with every answer.

Its purpose is to build confidence, introduce foundational concepts, and spark the curiosity that encourages meaningful participation during the Medtronic Spark Explore experience.

Curiosity – not mastery – is the goal!

What Will My Students Experience?

Every experience is designed to spark curiosity, encourage collaboration, and connect learning to real-world innovation.

INSIDE THE MOBILE LAB

Students work together across six interactive stations and a patient model, to explore the connection between the human heart and healthcare technology. Through a cardiovascular-focused challenge, students investigate how pacemakers support the heart and explore the concept of harvesting energy from the heart's movement as they imagine possibilities for future healthcare technology.

BUILDING INNOVATOR IDENTITY

Students aren't simply learning about healthcare technology; they step into the role of Innovators. Throughout the experience, students use curiosity, empathy, collaboration and problem-solving to tackle a meaningful challenge while building confidence in their ability to create, explore and solve problems.

INNOVATOR IDENTITY TRAITS

Curiosity | Empathy | Confidence | Collaboration | Problem-Solving

THE STUDENT EXPERIENCE

Students will have opportunities to:

- Explore an authentic healthcare innovation challenge.
- Collaborate as engineering teams.
- Apply the engineering design process.
- Analyze evidence and communicate ideas.
- Build innovator identity.
- Reflect on how innovation can improve lives.

Innovator Note

Students do not need prior experience with engineering or healthcare concepts to be successful.

The Medtronic Spark Explore experience is designed to encourage curiosity, build confidence, and create opportunities for every student to contribute.

Preparing Students for Success

Students arrive ready to explore with confidence.

Before participating in the Medtronic Spark Explore experience, students should complete the required Pre-Lab Curriculum.

The Pre-Lab Curriculum introduces foundational concepts that prepare students to actively engage in the health care technology experience while helping them make meaningful connections between classroom learning and the mobile laboratory investigation.

The curriculum is intentionally designed to build curiosity, not mastery, and encourages students to begin asking questions before they step onto the mobile vehicle.

REQUIRED PRE-LAB CURRICULUM

Before the scheduled visit, students will explore:

- Biomedical engineering
 - Anatomy of the heart
 - Cardiac health and pacemaker technology
 - Healthcare innovation
 - Engineering design
 - Key vocabulary
 - Collaboration and communication
 - The upcoming engineering challenge
-

Classroom Connection

Introducing foundational concepts before the visit allows students to spend more time exploring, collaborating, and applying new ideas during the immersive experience.

During the Medtronic Spark Explore Experience

Exploration becomes meaningful when students are encouraged to investigate, collaborate, and reflect.

During the mobile experience, Learning Undeclared educators facilitate immersive learning while classroom educators support student engagement and encourage productive collaboration.

Teachers are not expected to lead instruction during the mobile laboratory experience. Instead, their role is to encourage participation, celebrate curiosity, and help students connect the experience to classroom learning.

DURING THE EXPERIENCE, TEACHERS WILL:

- Accompany students onboard the vehicle at all times.
- Encourage respectful collaboration.
- Support and encourage active participation.
- Celebrate thoughtful questions and creative thinking.
- Observe student engagement and learning.
- Encourage students to see themselves as problem-solvers, designers, and innovators.

Good to Know

Students learn best when they feel comfortable exploring ideas, testing possibilities, and learning from one another. Curiosity and collaboration are encouraged throughout the experience.

Continuing the Learning

Reflection transforms an engaging experience into lasting learning.

Learning continues after students leave the mobile laboratory.

The required Post-Lab Curriculum provides opportunities for students to reflect on their experience, connect new learning to classroom concepts, and continue exploring how innovation, engineering, and healthcare technology work together to improve lives.

Classroom discussions and extension activities encourage students to think more deeply about the engineering challenge while reinforcing the knowledge and skills introduced throughout Medtronic Spark Explore.

REQUIRED POST-LAB CURRICULUM

Following the mobile laboratory experience, teachers will facilitate the required Post-Lab Curriculum. Students will:

- Reflect on their learning.
 - Understand how medical devices such as pacemakers are developed through a multi-stage collaborative engineering process.
 - See how health technology and medical device careers are interconnected roles within a system, not isolated jobs.
 - Understand how Innovation in medical technology requires a balance of technical performance, safety, and patient impact.
 - Gain clarity on how engineers use a combination of mindsets and skills (e.g., curiosity, persistence, collaboration) to solve complex problems.
-

Required

Completion of the Post-Lab Curriculum is required as part of the full Medtronic Spark Explore instructional experience.

Why It Matters

Students retain more of what they learn when they have opportunities to reflect, discuss, and apply new ideas after an immersive experience.

Supporting Your Success

Great learning experiences begin with well-supported educators.

At Learning Undeclared and Medtronic, we believe educators are essential partners in creating meaningful learning experiences. From initial planning through post-visit reflection, our goal is to provide the resources, communication, and support you need to confidently facilitate the Medtronic Spark Explore instructional experience.

You are not expected to become an expert in biomedical engineering or healthcare technology. Instead, your role is to encourage curiosity, foster discussion, and help students connect their experience to classroom learning.

Throughout the process, the Medtronic Spark Explore team will partner with you to ensure your classroom is prepared for a successful visit.

YOUR ROLE

As the classroom educator, you help create an environment where students feel comfortable exploring ideas, asking questions, and learning through collaboration.

During the Medtronic Spark Explore instructional experience, educators will:

- Prepare students using the required Pre-Lab Curriculum.

- Encourage curiosity and active participation.

- Support respectful collaboration.

- Facilitate the required Post-Lab Curriculum.

- Complete the required educator survey.

- Support completion of student surveys.

Educator Insight

One of the most valuable things you can do is encourage students to ask thoughtful questions. Curiosity often leads to the most meaningful learning.

Certificate of Completion

Your commitment to student learning deserves recognition.

Teachers may receive a **Certificate of Completion for 5 hours** by completing **all components** of the Medtronic Spark Explore experience, including the Pre-Curriculum, Mobile Lab Experience, Post-Curriculum, submission of the Teacher Survey, and administration and submission of Student Surveys.

REQUIREMENTS FOR CERTIFICATE OF COMPLETION

To receive Certificate of Completion, educators must complete the following:

- Required Pre-Lab Curriculum

- Participation in the Medtronic Spark Explore mobile laboratory experience

- Required Post-Lab Curriculum

- Educator Survey

- Facilitation of Student Surveys

- Submission of all required materials within two weeks of the scheduled visit

Required

Student and educator surveys help measure program impact and support continuous improvement. All required surveys and documentation must be submitted within two weeks of the mobile laboratory visit to qualify for the Certificate of Completion.

Good to Know

Survey responses are used to evaluate program quality, strengthen future experiences, and better understand the impact of Medtronic Spark Explore on educators and students.

Extending the Conversation

Some of the best learning happens after the experience ends.

The Medtronic Spark Explore experience often inspires thoughtful questions about engineering, healthcare, innovation, and future careers.

Continuing these conversations in the classroom helps students connect the experience to everyday learning while encouraging ongoing curiosity.

Consider asking questions such as:

- What surprised you most during today's experience?
- How can engineering improve people's lives?
- What role does teamwork play in solving healthcare challenges?
- Which health technology or healthcare careers would you like to learn more about?

These discussions encourage students to reflect on their experience while helping educators reinforce classroom learning.

Innovator Tip

Not every reflection needs a written response.

Sometimes the most meaningful learning happens through thoughtful conversation.

Measuring Success

Success is measured by curiosity, confidence, and engagement, not by finding the "right" answer.

A successful Medtronic Spark Explore experience is one where students leave asking more questions than they had when they arrived.

You may notice students:

- Asking follow-up questions about the technology they used.
- Collaborating more confidently.
- Talk excitedly with classmates about what they learned.
- Connecting classroom concepts to real-world applications.
- Expressing interest in engineering or healthcare careers they hadn't previously considered.
- Demonstrating greater confidence when sharing ideas.
- Beginning to see themselves as innovators who can contribute ideas and solutions to healthcare challenges.

These moments represent meaningful outcomes of the Medtronic Spark Explore instructional experience and help create lasting connections between classroom learning and future possibilities.

Why It Matters

Every student who leaves feeling more curious, more confident, or more inspired has taken an important step in their learning journey.

Those moments matter.

Educator Resources

Supporting Your Medtronic Spark Explore Experience

The following resources are designed to support educators before, during, and after the Medtronic Spark Explore instructional experience. Whether you're preparing students, connecting the experience to classroom learning, or completing post-visit activities, these tools provide quick access to the information and resources you'll need along the way.

INCLUDED IN THIS SECTION

Together, these resources are designed to help educators create meaningful learning experiences that inspire curiosity, encourage exploration, and connect classroom learning to real-world healthcare innovation.

Appendix A: State Standards Alignment

Supporting classroom instruction through authentic healthcare innovation.

Appendix B: Educator Success Checklist

A one-page implementation checklist designed to support educators throughout the Spark Explore instructional experience.

Appendix A

State Standards Alignment

Supporting Standards-Based STEM Instruction

The Medtronic Spark Explore instructional experience reinforces science, engineering, mathematics, and career exploration through authentic applications of healthcare innovation.

The following state-specific alignments demonstrate how Medtronic Spark Explore supports classroom instruction while encouraging curiosity, collaboration, and engineering thinking.

Participating States, 2026/27 School Year

- California
 - Colorado
 - Connecticut
 - Massachusetts
 - Minnesota
-

California State Standards Alignment

Medtronic Spark Explore

Connecting Classroom Learning to Authentic Healthcare Innovation

Medtronic Spark Explore complements the California Next Generation Science Standards (CA NGSS) by engaging students in authentic learning experiences that integrate science, engineering, and real-world healthcare innovation.

Throughout the instructional experience, students investigate meaningful healthcare challenges while applying scientific thinking, engineering design, collaboration, and evidence-based decision making. Medtronic Spark Explore provides opportunities for students to connect classroom learning to authentic applications of biomedical engineering and healthcare technology.

Rather than replacing classroom instruction, Medtronic Spark Explore extends and enriches grade-level learning through immersive, hands-on exploration.

CALIFORNIA NGSS OVERVIEW

Medtronic Spark Explore supports California's three-dimensional approach to science instruction by integrating:

- Science and Engineering Practices
- Crosscutting Concepts
- Disciplinary Core Ideas

Students investigate authentic phenomena, collaborate to solve engineering challenges, communicate ideas, and reflect on how science and engineering improve lives.

SCIENCE & ENGINEERING PRACTICES

California NGSS Practice

Medtronic Spark Explore Alignment

Asking Questions & Defining Problems	Students investigate an authentic healthcare challenge by asking questions, identifying needs, and exploring possible approaches to engineering design.
Developing and Using Models	Students use models, observations, and evidence to better understand biomedical engineering concepts and healthcare technology.
Planning and Carrying Out Investigations	Students investigate engineering concepts through guided exploration and collaborative problem solving.
Analyzing and Interpreting Data	Students examine evidence, identify patterns, compare observations, and communicate findings throughout the experience.
Constructing Explanations & Designing Solutions	Students apply the engineering design process to evaluate ideas and consider how technology can address real-world healthcare challenges.
Engaging in Argument from Evidence	Students justify ideas, discuss possible solutions, and support conclusions using observations and evidence gathered during the experience.
Obtaining, Evaluating & Communicating Information	Students communicate observations, collaborate with peers, and explain their thinking throughout the instructional experience.

ENGINEERING DESIGN STANDARDS

Medtronic Spark Explore aligns particularly well with the California middle school engineering design standards, including:

CA NGSS Standard

Medtronic Spark Explore Alignment

MS-ETS1-1	Students define an authentic healthcare engineering challenge while considering design criteria and constraints.
MS-ETS1-2	Students evaluate multiple possible solutions using evidence gathered throughout the engineering investigation.
MS-ETS1-3	Students analyze data from testing and observations to compare design ideas and identify strengths and limitations.
MS-ETS1-4	Students refine ideas through collaboration and evidence-based discussion while recognizing that engineering is an iterative process.

DISCIPLINARY CORE IDEAS

Medtronic Spark Explore reinforces key middle school life science and engineering concepts, including:

- Structure and Function
- Information Processing
- Engineering Design
- Systems Thinking
- Cause and Effect
- Stability and Change

These concepts are explored through authentic healthcare applications that help students connect science learning to everyday life.

MATHEMATICS CONNECTIONS

During Medtronic Spark Explore, students strengthen mathematical reasoning by:

- Interpreting evidence and observations
- Comparing design ideas
- Identifying patterns
- Supporting conclusions with evidence
- Communicating quantitative thinking

These opportunities reinforce mathematical practices within authentic engineering contexts.

FUTURE PATHWAYS

Medtronic Spark Explore introduces students to future opportunities in:

- Biomedical Engineering
- Healthcare Technology
- Product Development
- Manufacturing Engineering
- Clinical Innovation
- Research & Development
- Quality Engineering

Students begin to recognize how classroom learning can connect to meaningful careers focused on improving lives through science, engineering, and innovation.

HEALTH SCIENCE CONNECTIONS

Through age-appropriate exploration of healthcare technology, students investigate:

- Human body systems.
- Cardiac health.
- Biomedical engineering.
- Patient-centered innovation.
- Engineering solutions that improve quality of life.

These experiences help students understand how science, engineering, and healthcare work together to address real-world challenges.

Classroom Connection

Medtronic Spark Explore provides California educators with authentic opportunities to reinforce the California Next Generation Science Standards while connecting classroom learning to engineering, healthcare innovation, and future STEM pathways.

Colorado State Standards Alignment

Medtronic Spark Explore

Connecting Classroom Learning to Authentic Healthcare Innovation

Medtronic Spark Explore complements the Colorado Academic Standards for Science by engaging students in authentic learning experiences that integrate science, engineering, collaboration, and real-world healthcare innovation.

Throughout the instructional experience, students investigate meaningful healthcare challenges while applying scientific thinking, engineering design, evidence-based decision making, and collaborative problem solving. Medtronic Spark Explore provides opportunities for students to connect classroom learning with authentic applications of biomedical engineering and healthcare technology.

Rather than replacing classroom instruction, Medtronic Spark Explore enriches grade-level learning by encouraging curiosity, exploration, and meaningful connections between science and everyday life.

COLORADO SCIENCE STANDARDS OVERVIEW

Medtronic Spark Explore supports Colorado's three-dimensional approach to science instruction by integrating:

- Science & Engineering Practices
- Crosscutting Concepts
- Disciplinary Core Ideas

Students investigate authentic healthcare challenges, collaborate as engineering teams, communicate evidence-based ideas, and discover how science and engineering work together to improve lives.

SCIENCE & ENGINEERING PRACTICES (THREE-DIMENSIONAL LEARNING)

Colorado Science & Engineering Practice

Medtronic Spark Explore Alignment

Asking Questions & Defining Problems	Students investigate authentic healthcare challenges by asking questions, identifying needs, and exploring engineering solutions that improve patient outcomes.
Developing and Using Models	Students use observations, representations, and discussion to explore biomedical engineering concepts and healthcare technology.
Planning and Carrying Out Investigations	Students participate in guided investigations that encourage exploration, collaboration, and evidence-based thinking.
Analyzing and Interpreting Data	Students evaluate observations, identify patterns, compare ideas, and communicate conclusions using evidence gathered throughout the experience.
Constructing Explanations & Designing Solutions	Students apply the engineering design process to investigate solutions, evaluate ideas, and refine their thinking through collaboration.
Engaging in Argument from Evidence	Students justify ideas, explain observations, and support conclusions through respectful discussion and evidence-based reasoning.
Obtaining, Evaluating & Communicating Information	Students communicate scientific ideas, collaborate with peers, and reflect on how innovation contributes to solving healthcare challenges.

ENGINEERING DESIGN STANDARDS

Medtronic Spark Explore provides authentic opportunities for students to experience engineering as an iterative process grounded in inquiry, creativity, collaboration, and continuous improvement.

Colorado Engineering Design Focus

Medtronic Spark Explore Alignment

Defining Design Challenges	Students investigate an authentic healthcare engineering challenge while considering criteria, constraints, and patient needs.
Developing Possible Solutions	Students collaborate to explore multiple approaches and evaluate possible engineering solutions.
Evaluating Evidence	Students analyze observations and evidence to compare ideas and make informed decisions.
Improving Designs Through Iteration	Students recognize that engineering involves testing ideas, learning from evidence, and continually improving solutions.

DISCIPLINARY CORE IDEAS

Medtronic Spark Explore reinforces important middle school science concepts through authentic healthcare applications, including:

- Human Body Systems
- Biomedical Engineering
- Engineering Design
- Structure and Function
- Systems and System Models
- Cause and Effect
- Stability and Change

These concepts help students connect classroom learning to real-world healthcare innovation while strengthening scientific understanding.

MATHEMATICS CONNECTIONS

Throughout the instructional experience, students strengthen mathematical thinking by:

- Interpreting observations and evidence
- Identifying patterns and relationships
- Comparing engineering solutions
- Supporting conclusions with evidence
- Communicating quantitative observations

These experiences reinforce mathematical reasoning within authentic engineering contexts.

FUTURE PATHWAYS

Medtronic Spark Explore introduces students to future opportunities in:

- Biomedical Engineering
- Healthcare Technology
- Product Development
- Clinical Engineering
- Manufacturing Engineering
- Research & Development
- Quality Engineering
- Healthcare Innovation

Students begin to recognize how classroom learning connects to meaningful careers focused on improving lives through science, engineering, technology, and innovation.

HEALTH SCIENCE CONNECTIONS

Through age-appropriate exploration of healthcare technology, students investigate:

- Human body systems
- Cardiac health
- Biomedical engineering
- Healthcare technology
- Patient-centered innovation
- Engineering solutions that improve lives

These experiences encourage students to explore how science, engineering, and healthcare work together to address meaningful real-world challenges.

Classroom Connection

Medtronic Spark Explore provides Colorado educators with authentic opportunities to reinforce the Colorado Academic Standards for Science while connecting classroom learning to engineering design, healthcare innovation, and future STEM pathways.

Connecticut State Standards Alignment

Medtronic Spark Explore

Connecting Classroom Learning to Authentic Healthcare Innovation

Medtronic Spark Explore complements the Connecticut Next Generation Science Standards (CT NGSS) by engaging students in authentic learning experiences that integrate science, engineering, collaboration, and real-world healthcare innovation.

Throughout the instructional experience, students investigate meaningful healthcare challenges while applying scientific thinking, engineering design, evidence-based decision making, and collaborative problem solving. Medtronic Spark Explore provides opportunities for students to connect classroom learning with authentic applications of biomedical engineering and healthcare technology.

Rather than replacing classroom instruction, Medtronic Spark Explore enriches grade-level learning by encouraging curiosity, exploration, and meaningful connections between science, engineering, and everyday life.

CONNECTICUT SCIENCE STANDARDS OVERVIEW

Medtronic Spark Explore supports Connecticut's three-dimensional approach to science instruction by integrating:

- Science & Engineering Practices
- Crosscutting Concepts
- Disciplinary Core Ideas

Students investigate authentic healthcare challenges, collaborate as engineering teams, communicate evidence-based ideas, and explore how science and engineering contribute to improving lives.

SCIENCE & ENGINEERING PRACTICES (THREE-DIMENSIONAL LEARNING)

Connecticut Science & Engineering Practice

Medtronic Spark Explore Alignment

Asking Questions & Defining Problems	Students investigate authentic healthcare challenges by asking questions, identifying needs, and exploring engineering solutions that support patient care.
Developing and Using Models	Students use models, observations, and collaborative discussion to deepen their understanding of biomedical engineering and healthcare technology.
Planning and Carrying Out Investigations	Students engage in guided investigations that promote inquiry, collaboration, and evidence-based exploration.
Analyzing and Interpreting Data	Students evaluate observations, identify patterns, compare evidence, and communicate conclusions throughout the engineering experience.
Constructing Explanations & Designing Solutions	Students apply the engineering design process to investigate solutions, evaluate ideas, and refine their thinking through collaboration.
Engaging in Argument from Evidence	Students justify ideas, communicate reasoning, and support conclusions using evidence gathered throughout the experience.
Obtaining, Evaluating & Communicating Information	Students collaborate with peers, communicate scientific ideas, and reflect on how engineering contributes to solving healthcare challenges.

ENGINEERING DESIGN STANDARDS

Medtronic Spark Explore provides authentic opportunities for students to experience engineering as a collaborative process of investigation, innovation, testing, and continuous improvement.

Connecticut Engineering Design Focus

Medtronic Spark Explore Alignment

Defining Engineering
Challenges

Students investigate an authentic healthcare challenge while considering patient needs, design criteria, and engineering constraints.

Developing Possible
Solutions

Students collaborate to explore multiple engineering approaches and evaluate potential solutions.

Analyzing Evidence

Students compare observations, evaluate evidence, and communicate ideas before selecting possible solutions.

Improving Designs Through
Iteration

Students recognize that engineering is an ongoing process of testing, learning, and refining ideas.

DISCIPLINARY CORE IDEAS

Medtronic Spark Explore reinforces key middle school science concepts through authentic healthcare applications, including:

- Human Body Systems
- Biomedical Engineering
- Engineering Design
- Structure and Function
- Systems and System Models
- Cause and Effect
- Stability and Change

These concepts help students connect classroom learning to healthcare innovation while strengthening scientific understanding through authentic exploration.

MATHEMATICS CONNECTIONS

Throughout the instructional experience, students strengthen mathematical thinking by:

- Interpreting observations and evidence.
- Identifying patterns and relationships.
- Comparing engineering solutions.
- Supporting conclusions with evidence.
- Communicating quantitative observations.

These experiences reinforce mathematical reasoning within authentic engineering contexts.

FUTURE PATHWAYS

Medtronic Spark Explore introduces students to future opportunities in:

- Biomedical Engineering
- Healthcare Technology
- Clinical Engineering
- Product Development
- Manufacturing Engineering
- Research & Development
- Quality Engineering
- Healthcare Innovation

Students begin to recognize how classroom learning connects to meaningful careers focused on improving lives through science, engineering, technology, and innovation.

HEALTHCARE CONNECTIONS

Through age-appropriate exploration of healthcare technology, students investigate:

- Human body systems
- Cardiac health
- Biomedical engineering
- Healthcare technology
- Patient-centered innovation
- Engineering solutions that improve lives

These experiences encourage students to explore how science, engineering, and healthcare work together to address meaningful real-world challenges.

PRIMARY INSTRUCTIONAL CONNECTIONS

- Science & Engineering Practices
 - Engineering Design
 - Crosscutting Concepts
 - Mathematics Connections
 - STEM Career Exploration
 - Healthcare Innovation
-

Classroom Connection

Medtronic Spark Explore provides Connecticut educators with authentic opportunities to reinforce the Connecticut Next Generation Science Standards while connecting classroom learning to engineering design, healthcare innovation, and future STEM pathways.

Massachusetts State Standards Alignment

Medtronic Spark Explore

Connecting Classroom Learning to Authentic Healthcare Innovation

Medtronic Spark Explore complements the Massachusetts Science, Technology/Engineering Standards by engaging students in authentic learning experiences that integrate science, engineering, collaboration, and real-world healthcare innovation.

Throughout the instructional experience, students investigate meaningful healthcare challenges while applying scientific thinking, engineering design, evidence-based decision making, and collaborative problem solving. Medtronic Spark Explore provides opportunities for students to connect classroom learning with authentic applications of biomedical engineering and healthcare technology.

Rather than replacing classroom instruction, Medtronic Spark Explore enriches grade-level learning by encouraging curiosity, exploration, and meaningful connections between science, engineering, and everyday life.

MASSACHUSETTS SCIENCE & TECHNOLOGY/ENGINEERING STANDARDS OVERVIEW

Medtronic Spark Explore supports Massachusetts' three-dimensional approach to science instruction by integrating:

- Science & Engineering Practices
- Crosscutting Concepts
- Disciplinary Core Ideas

Students investigate authentic healthcare challenges, collaborate as engineering teams, communicate evidence-based ideas, and explore how science and engineering contribute to improving lives.

SCIENCE & ENGINEERING PRACTICES (THREE-DIMENSIONAL LEARNING)

Massachusetts Science & Engineering Practice

Medtronic Spark Explore Alignment

Asking Questions & Defining Problems	Students investigate authentic healthcare challenges by asking questions, identifying needs, and exploring engineering solutions that support patient care.
Developing and Using Models	Students use models, observations, and collaborative discussion to deepen their understanding of biomedical engineering and healthcare technology.
Planning and Carrying Out Investigations	Students participate in guided investigations that encourage inquiry, collaboration, and evidence-based exploration.
Analyzing and Interpreting Data	Students evaluate observations, identify patterns, compare evidence, and communicate conclusions throughout the engineering experience.
Constructing Explanations & Designing Solutions	Students apply the engineering design process to investigate solutions, evaluate ideas, and refine their thinking through collaboration.
Engaging in Argument from Evidence	Students justify ideas, communicate reasoning, and support conclusions using evidence gathered throughout the experience.
Obtaining, Evaluating & Communicating Information	Students collaborate with peers, communicate scientific ideas, and reflect on how engineering contributes to solving healthcare challenges.

ENGINEERING DESIGN STANDARDS

Medtronic Spark Explore reinforces Massachusetts' emphasis on engineering design by providing students with opportunities to experience engineering as a process of inquiry, creativity, testing, and continuous improvement.

Massachusetts Engineering Design Focus

Medtronic Spark Explore Alignment

Defining Engineering Challenges	Students investigate an authentic healthcare engineering challenge while considering patient needs, design criteria, and engineering constraints.
Developing Possible Solutions	Students collaborate to explore multiple engineering approaches and evaluate potential solutions.
Evaluating Evidence	Students analyze observations, compare evidence, and communicate ideas before selecting possible solutions.
Improving Designs Through Iteration	Students recognize that engineering is an iterative process of testing, learning, and refining ideas.

DISCIPLINARY CORE IDEAS

Medtronic Spark Explore reinforces key middle school science and technology/engineering concepts through authentic healthcare applications, including:

- Human Body Systems
- Biomedical Engineering
- Engineering Design
- Structure and Function
- Systems and System Models
- Cause and Effect
- Stability and Change

These concepts help students connect classroom learning to healthcare innovation while strengthening scientific understanding through authentic exploration.

MATHEMATICS CONNECTIONS

Throughout the instructional experience, students strengthen mathematical thinking by:

- Interpreting observations and evidence
- Identifying patterns and relationships
- Comparing engineering solutions
- Supporting conclusions with evidence
- Communicating quantitative observations

These experiences reinforce mathematical reasoning within authentic engineering contexts.

FUTURE PATHWAYS

Medtronic Spark Explore introduces students to future opportunities where science, engineering, technology, and innovation come together to improve lives.

Students explore pathways including:

- Biomedical Engineering
- Healthcare Technology
- Product Development
- Clinical Engineering
- Manufacturing Engineering
- Research & Development
- Quality Engineering
- Healthcare Innovation

These experiences encourage students to see how classroom learning can connect to future educational pathways and meaningful careers focused on solving real-world healthcare challenges.

HEALTHCARE CONNECTIONS

Through age-appropriate exploration of healthcare technology, students investigate:

- Human body systems
- Cardiac health
- Biomedical engineering
- Healthcare technology
- Patient-centered innovation
- Engineering solutions that improve lives

These experiences encourage students to explore how science, engineering, and healthcare work together to address meaningful real-world challenges.

PRIMARY INSTRUCTIONAL CONNECTIONS

- Science & Engineering Practices
 - Engineering Design
 - Crosscutting Concepts
 - Mathematics Connections
 - Future Pathways
 - Healthcare Innovation
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Classroom Connection

Medtronic Spark Explore provides Massachusetts educators with authentic opportunities to reinforce the Massachusetts Science, Technology/Engineering Standards while connecting classroom learning to engineering design, healthcare innovation, and future STEM pathways.

Minnesota State Standards Alignment

Medtronic Spark Explore

Connecting Classroom Learning to Authentic Healthcare Innovation

Medtronic Spark Explore complements the Minnesota Academic Standards in Science by engaging students in authentic learning experiences that integrate science, engineering, collaboration, and real-world healthcare innovation.

Throughout the instructional experience, students investigate meaningful healthcare challenges while applying scientific thinking, engineering design, evidence-based decision making, and collaborative problem solving. Medtronic Spark Explore provides opportunities for students to connect classroom learning with authentic applications of biomedical engineering and healthcare technology.

Rather than replacing classroom instruction, Medtronic Spark Explore enriches grade-level learning by encouraging curiosity, exploration, and meaningful connections between science and everyday life.

MINNESOTA SCIENCE STANDARDS OVERVIEW

Medtronic Spark Explore supports Minnesota's three-dimensional approach to science instruction by integrating:

- Science and Engineering Practices
- Crosscutting Concepts
- Disciplinary Core Ideas

Students investigate authentic healthcare challenges, collaborate as engineering teams, communicate ideas using evidence, and reflect on how science and engineering work together to improve lives.

SCIENCE & ENGINEERING PRACTICES

Minnesota Science & Engineering Practice

Medtronic Spark Explore Alignment

Asking Questions & Investigating Phenomena	Students investigate authentic healthcare challenges by asking questions, exploring observations, and identifying opportunities for engineering solutions.
Developing and Using Models	Students explore biomedical engineering concepts through models, observations, and collaborative discussion that support scientific understanding.
Planning and Carrying Out Investigations	Students participate in guided investigations that encourage exploration, evidence gathering, and collaborative problem solving.
Analyzing and Interpreting Data	Students examine observations, compare information, identify patterns, and communicate evidence-based conclusions.
Constructing Explanations & Designing Solutions	Students apply engineering thinking to evaluate possible solutions while recognizing that innovation is an iterative process.
Communicating Scientific Information	Students collaborate with peers, explain their thinking, justify ideas, and communicate observations throughout the experience.

ENGINEERING DESIGN CONNECTIONS

Medtronic Spark Explore provides authentic opportunities for students to experience engineering as a process of investigation, collaboration, and continuous improvement.

Minnesota Engineering Design Focus

Medtronic Spark Explore Alignment

Defining Engineering Challenges	Students investigate an authentic healthcare challenge while considering the needs of patients and the role of healthcare technology.
Evaluating Possible Solutions	Students compare ideas, analyze evidence, and discuss multiple approaches before drawing conclusions.
Improving Designs Through Iteration	Students recognize that engineering involves testing ideas, learning from evidence, and continually refining solutions.

DISCIPLINARY CORE IDEAS

Medtronic Spark Explore reinforces important middle school science concepts through authentic healthcare applications, including:

- Human Body Systems
- Biomedical Engineering
- Engineering Design
- Structure and Function
- Systems Thinking
- Cause and Effect
- Stability and Change

These concepts help students connect classroom learning to real-world healthcare innovation while strengthening scientific understanding.

MATHEMATICS CONNECTIONS

Throughout the instructional experience, students strengthen mathematical thinking by:

- Interpreting observations and evidence
- Comparing possible solutions
- Identifying patterns and relationships
- Supporting conclusions with evidence
- Communicating quantitative observations

These opportunities reinforce mathematical reasoning within authentic engineering contexts.

FUTURE PATHWAYS

Medtronic Spark Explore introduces students to future opportunities in:

- Biomedical Engineering
- Healthcare Technology
- Product Development
- Manufacturing Engineering
- Research & Development
- Quality Engineering
- Clinical Technology
- Healthcare Innovation

Students begin to recognize how classroom learning connects to meaningful careers focused on improving lives through science, engineering, and innovation.

HEALTH SCIENCE CONNECTIONS

Through age-appropriate exploration of healthcare technology, students investigate:

- Human body systems
- Cardiac health
- Biomedical engineering
- Healthcare technology
- Patient-centered innovation
- Engineering solutions that improve lives

These experiences encourage students to explore how science, engineering, and healthcare work together to address meaningful real-world challenges.

Classroom Connection

Medtronic Spark Explore provides Minnesota educators with authentic opportunities to reinforce science and engineering instruction while connecting classroom learning to healthcare innovation, engineering design, and future STEM pathways.

Appendix B

Medtronic Spark Explore Educator Success Checklist

A Quick Reference Guide for Educators

The Medtronic Spark Explore instructional experience is designed to prepare students before their visit, engage them during the mobile laboratory experience, and extend learning afterward.

BEFORE YOUR VISIT

Prepare

- ☐ Review the Medtronic Spark Explore Educator Guide.
- ☐ Attend the scheduled pre-visit meeting.
- ☐ Confirm class schedule.
- ☐ Ensure all required documents have been submitted (parking map, teacher contacts, class schedule, permission slips distributed to students)
- ☐ Review student accommodations or accessibility needs.
- ☐ Ensure each student has a signed permission slip.

Build Curiosity

- ☐ Complete the required Pre-Lab Curriculum.
 - ☐ Introduce key vocabulary and foundational concepts.
 - ☐ Encourage students to arrive ready to explore and ask questions.
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DAY OF YOUR VISIT

Explore

- ☐ Welcome the Medtronic Spark Explore team.
 - ☐ Turn in student permission slips as class boards the lab.
 - ☐ Encourage curiosity and collaboration.
 - ☐ Support student participation.
 - ☐ Celebrate questions, teamwork, and creative thinking.
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AFTER YOUR VISIT

Reflect

- ☐ Complete the required Post-Lab Curriculum.
 - ☐ Complete the Educator Survey.
 - ☐ Facilitate Student Surveys.
 - ☐ Submit all required materials within **two weeks**.
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