iBlocks®

Let's spark creativity

iBlocks®

Project Based Learning

Spark inspiration with iBlocks – experiential project based learning activities that engage students in critical thinking, teamwork, and fun!

Cover image credit: James Webb Space Telescope | NASA

What's Inside

iBlocks® PROJECT BASED LEARNING

Introduction to iBlocks

EASY LIFT, HIGH REWARD
Because iBlocks are student-led and teacher-guided, they offer a robust and creative environment for everyone. Testing, grading, and formal evaluation are eliminated, and instead, students demonstrate mastery and learning through self-evaluation, discussion, and overall engagement with the project.

AN ENHANCEMENT TO YOUR EXISTING CURRICULUM
Enrich your existing curriculum with an iBlock, or use it to kick off a STEM initiative. An iBlock is designed to supplement your instruction with content that gives students a place to invent, explore, and take ownership of their learning.

AN OUT-OF-THE-BOX SOLUTION
Each iBlock includes everything you need to implement it effectively in the classroom, from a framework that aligns to national standards, to student workbooks, a teacher's guide to help you facilitate, and even self-assessments to help students keep their learning on track.

DRIVEN BY DESIGN THINKING
In each iBlock you'll see a strong focus on engineering design concepts like researching, constructing, testing, evaluating, and redesigning, since an iBlock teaches students that learning is a journey — not a straight line.

BUILT AROUND A CAPSTONE PROJECT
Each iBlock culminates in a capstone project that brings together everything students have learned throughout their iBlock, from their earliest research to their latest redesign.

THE ESSENTIAL IBLOCK PACKAGE

- LESSON PLAN
- STUDENT ASSESSMENT
- SKILLS MATRIX
- TEACHER'S GUIDE
- STUDENT WORKBOOK
- FRAMEWORK

An Essential iBlock Package contains everything you need to implement experiential, project-based learning in the classroom. From skills and objectives to critical thinking and reflection, iBlocks are the complete thought. Let us provide you with everything you need for impactful learning experiences – all you have to handle are the logistics.

Build an iBlock Sequence

GRADES | K-5 | TO | 6-8 | TO | 9-12

Because **iBlocks grow with students**, they are a great way to continue exploring skills and interests in a particular field.

Consider your school building(s) and the range of grades that they hold. With the option to **build a multi-year sequence of iBlocks**, you can provide PBL content that expands and connects student learning across your building.

HERE ARE SOME SEQUENCES THAT WE RECOMMEND:

iBlocks series: Building Literacy
Literacy is an essential skill to have, regardless of what your future goals are, what field you plan to work in, or even what subjects interest you. In our Building Literacy series, we cover storytelling, sequencing, creative expression, vocabulary & language development, and fiction & non-fiction appreciation. Each iBlock is designed to spark interest and inspire creativity for hands-on literacy that gives students an authentic and meaningful experience with the written word.

- Create a Short Story
- Design a Comic Book
- Develop a Play

iBlocks series: Robotics
In this sequence, students will get to explore, invent, and innovate with classroom robots. iBlocks in this series work on a variety of skills such as design thinking, iterative processes, coding and debugging, and more. As we move forward into a technologically advanced future, skills such as these will be essential and required for careers in computer science, robotics, and research & development. Give your students a leg up with these fun, experiential projects that build and advance student skills from elementary through high school.

- Robotic Field Day
- Robotic Amusement Park
- Robotic Assembly Line

iBlocks series: Space Systems
The final frontier is a source of endless fascination for students and scientists alike. Give your class a thrilling out of this world experience while also building skills and learning important scientific concepts. From our solar system to the furthest reaches of the observable universe, this series of iBlocks will challenge your students in ways they never imagined and expose them to concepts such as the engineering design process, communication systems, and appreciation for scientific discoveries.

- Light and Shadows
- Create a Model of an Eclipse
- Engineer a Telescope

iBlocks Topic

Class Pet

DESCRIPTION:

Getting a class pet is an exciting event for students! In this iBlock, students will learn about different class pets, then choose a robot to represent a particular pet. They will also propose a good classroom home for it and design a presentation to convince the class to vote for their idea. If students are convincing, their pet might even be selected!

FOCUS OF THE IBLOCK:

Grade Bands: K-2, 3-5

Primary Focus: Programming

Secondary Focus: Animal Biology, Ecology

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: KIBO, Sphero, Ozobot, Wonder Workshop

Related Industry Sectors: Scientific Research & Engineering; Information & Communication Technologies; Manufacturing & Product Development

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Here is a sample content standard for this iBlock:

Develop questions and participate in shared research and explorations to answer questions and to build knowledge. (Next Generation ELA Standards, 2W6)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:

K-2 STEM Bundle

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

KIBO BASICS
OTISpd.com/events/view/13972

Clean Water and Sanitation

DESCRIPTION:

Across the globe, billions of people lack access to clean water. Among the United Nations' 17 Sustainable Development Goals, goal number six is to "ensure availability and sustainable management of water and sanitation for all." Throughout this iBlock, students will explore where drinking water comes from, identify contaminants, and ultimately design and engineer their own water filtration system.

FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: STEM, Science

Secondary Focus: Math

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: 3D printer

Related Industry Sectors: Scientific Research & Engineering; Information & Communication Technologies; Manufacturing & Product Development

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Here is a sample content standard for this iBlock:

Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (Next Generation Science Standards, MS-ESS3-3; MS-ESS3-4)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:

Mobile STEM Bundle UMS3

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

ENGAGING IN CITIZEN SCIENCE

OTISpd.com/events/view/14172

Create a Model of an Eclipse

Here is a sample content standard for this iBlock:

Develop and use a model of the Earth-Sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the Sun and moon, and seasons. (MS-ESS1-1)

DESCRIPTION:

The Earth-Sun-Moon system has been studied for thousands of years. The interaction of these celestial bodies impacts our tides, seasons, and perceptions of time. In this iBlock, students explore the size and scale of our solar system and the phenomenon of eclipses. Then, students get to design and construct a model of our Earth-Sun-Moon system using 3D printers, and use that model to recreate a solar and lunar eclipse

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:

Mobile STEM Bundle

www.mobilestemcarts.com

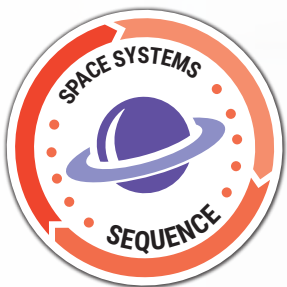## FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: Astronomy, 3D printing

Secondary Focus: Engineering

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: 3D printer

Related Industry Sectors: Scientific Research & Engineering; Manufacturing & Product Development

SPACE SYSTEMS SEQUENCE

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

MAKEY MAKEY CIRCUITS
OTISpd.com/events/view/13972

Create a Short Story

DESCRIPTION:

Despite the natural fast-paced read element to short stories, this type of literature typically contains the same components of a standard novel including characters, conflict, plot, and a theme. In this iBlock, students will develop a short story using their knowledge of literary elements and work through the process of writing a story: character development, narrative arc, developing visuals, reviewing one another's work, and presenting their final product.
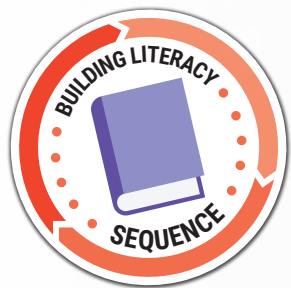
FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: ELA/Writing

Secondary Focus: Art

Additional Foci: Advanced Literacy, Transferable Skills, Social and Emotional Learning

Related Industry Sectors: Arts, Media & Entertainment, Communications

BUILDING LITERACY
SEQUENCE

Here is a sample content standard for this iBlock:

In literary texts, analyze how elements of plot are related, affect one another, and contribute to meaning. (6-8R3; RL)

iBlocks Student Workbook
Building Literacy: Create a Short Story

www.iBlocks.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

🖥 **GROWING GREAT WRITERS WITH SCHOOLOGY**
OTISpd.com/events/view/16115

Create a Video Game

DESCRIPTION:

Within the last 40 years, video games have been an essential part of our media entertainment. From arcades to home consoles, and now to our smartphones, video games have found many outlets in which new audiences can be reached. In this iBlock, students will create their own compelling video game from start to finish using Bloxels, and then create their own official video game reviews.

FOCUS OF THE IBLOCK:

Grade Bands: 9-12

Primary Focus: Literacy

Secondary Focus: Engineering design

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Required Technologies: Bloxels, Makey Makey (extension only)

Related Industry Sectors: S Arts, Media, & Entertainment

Here is a sample content standard for this iBlock:

Determine the key ideas or conclusions of a source; trace the source's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the source. (Next Generation ELA Standards, 9-10RST2)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundles:

Mobile STEM Bundle
9-12 Maker Bundle

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

BLOXELS BASICS
OTISpd.com/events/view/14181

Design a Comic Book

DESCRIPTION:

From images, to text, to color palette, there is a lot to consider when designing a comic book. How are comics similar to a short story? How are they different? In this iBlock, students will investigate the history of comics and various comic texts before creating their own masterpiece. With attention to how established comic artists perfect their craft, these modules will help unleash creativity and provide a new means of expression. Finally, students will bring all of their hard work together as they create their very own comic convention.
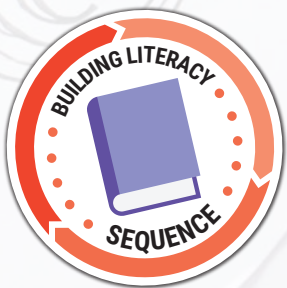
FOCUS OF THE IBLOCK:

Grade Bands: 6-8, 9-12

Primary Focus: ELA, Art

Secondary Focus: Communications, Visual Design

Additional Foci: Advanced Literacy, Transferable Skills, Social and Emotional Learning

Related Industry Sectors: Arts, Media & Entertainment, Communications

BUILDING LITERACY SEQUENCE

www.iBlocks.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

ENHANCING LITERACY WITH PIXTON COMICS

OTISpd.com/events/view/14368

Designing a Board Game

DESCRIPTION:

Board games are experiencing a tremendous revival, fueled by new styles of gaming. A shift from luck and conflict to strategy and cooperation has brought new players into the genre. In this iBlock, students will plan a game, research game mechanics, design their play area and pieces, and then determine how to play-test their creation. Finally, they'll examine how to package and publicize their game, and maybe even present a sales pitch to interested buyers.

FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: ELA, Engineering

Secondary Focus: Art, Marketing

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: 3D printer

Related Industry Sectors: Arts, Media, & Entertainment; Marketing, Sales & Services

Here is a sample content standard for this iBlock:

Demonstrate persistence in developing skills with various materials, methods, and artmaking approaches in creating works of art or design. (Learning Standards for the Arts, VA. Cr2.1.7a.)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
Mobile STEM Bundle

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

IMPLEMENTING A 3D DESIGN CHALLENGE WITH TINKERCAD
OTISpd.com/events/view/14001

Develop a Play

DESCRIPTION:

How does a story change when it's developed into a play? In this iBlock, that's exactly what students will explore as they become playwrights. Before writing their play, students will take a closer look at the history of theatre and play structure, then they will write and perform an original one-act play. Considerations will be made to set design, costuming, sound, lighting, casting, and blocking. Students can even consider how they could convert their play into a movie. It's time to "break a leg!"
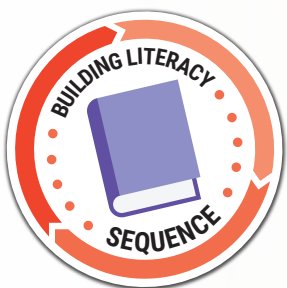
FOCUS OF THE IBLOCK:

Grade Bands: 9-12

Primary Focus: ELA, Performing Arts

Secondary Focus: Communications

Additional Foci: Advanced Literacy, Transferable Skills, Social and Emotional Learning

Possible Suggested Technologies: Glowforge, 3D printer

Related Industry Sectors: Arts, Media & Entertainment, Communications

Here is a sample content standard for this iBlock:

Synthesize knowledge from a variety of dramatic forms, theatrical conventions, and technologies to create the visual composition of a drama/ theatre work. (HS Advanced TH:Cr1.1.III a.)

www.iBlocks.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

INTRO TO FLIPGRID
OTISpd.com/events/view/15087

Engineer a Telescope

DESCRIPTION:

Scientists have been trying to see and explore the mysteries of the universe for centuries. Over time, our understanding of space and the technology available to view the mysteries found there has evolved. In this iBlock, students will learn about the evolution of the telescope and the optical science that makes them work. Using their new or expanded knowledge, students will design and build a telescope, using 3D printed materials and other consumables, to make their own observations about space!
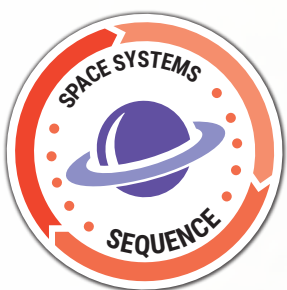
FOCUS OF THE IBLOCK:

Grade Bands: 9-12

Primary Focus: Astronomy, 3D printing

Secondary Focus: Engineering

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: 3D printer

Related Industry Sectors: Scientific Research & Engineering

Here is a sample content standard for this iBlock:

Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. (HS-ESS1-4)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
Mobile STEM Bundle

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

OPTIMIZING YOUR 3D PRINT
OTISpd.com/events/view/13921

iBlocks Topic

Engineering 3D Printed Instruments

DESCRIPTION:

The sound an instrument produces has a lot to do with the materials that it's made of. An instrument made of wood has a very different sound than one made of brass. What about a plastic instrument? In this iBlock, students will investigate the science of sound, how instruments produce sound, and the difference materials can make in producing that sound.

In addition, students will explore the anatomy of particular instruments, and become familiar with the foundations of music composition and 3D design.

FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: Musical instruments, Sound Engineering

Secondary Focus: Music

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: 3D printer, Makey Makey

Related Industry Sectors: Scientific Research & Engineering; Manufacturing & Product Development; Arts, A/V Technology & Communication

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Here is a sample content standard for this iBlock:

Generate and compare multiple solutions that use patterns to transfer information. (4-PS4-3)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
Mobile STEM Bundle

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

ULTIMAKER 3/3 EXTENDED BASICS

OTISpd.com/events/view/13952

Engineering an Assistive Game Controller

DESCRIPTION:

In this iBlock, students will learn about inclusivity, game controller design, and the gaming industry. Then, they'll work towards creating a game controller for a gamer with disabilities to use with a simple coded video game. This iBlock takes students through the engineering design process from research on disabilities and the history of the game controller, to designing and building an assistive controller and simple game, to improving their device and hosting an arcade event!

In addition, students will explore the anatomy of particular instruments, and become familiar with the foundations of music composition and 3D design.

FOCUS OF THE IBLOCK:
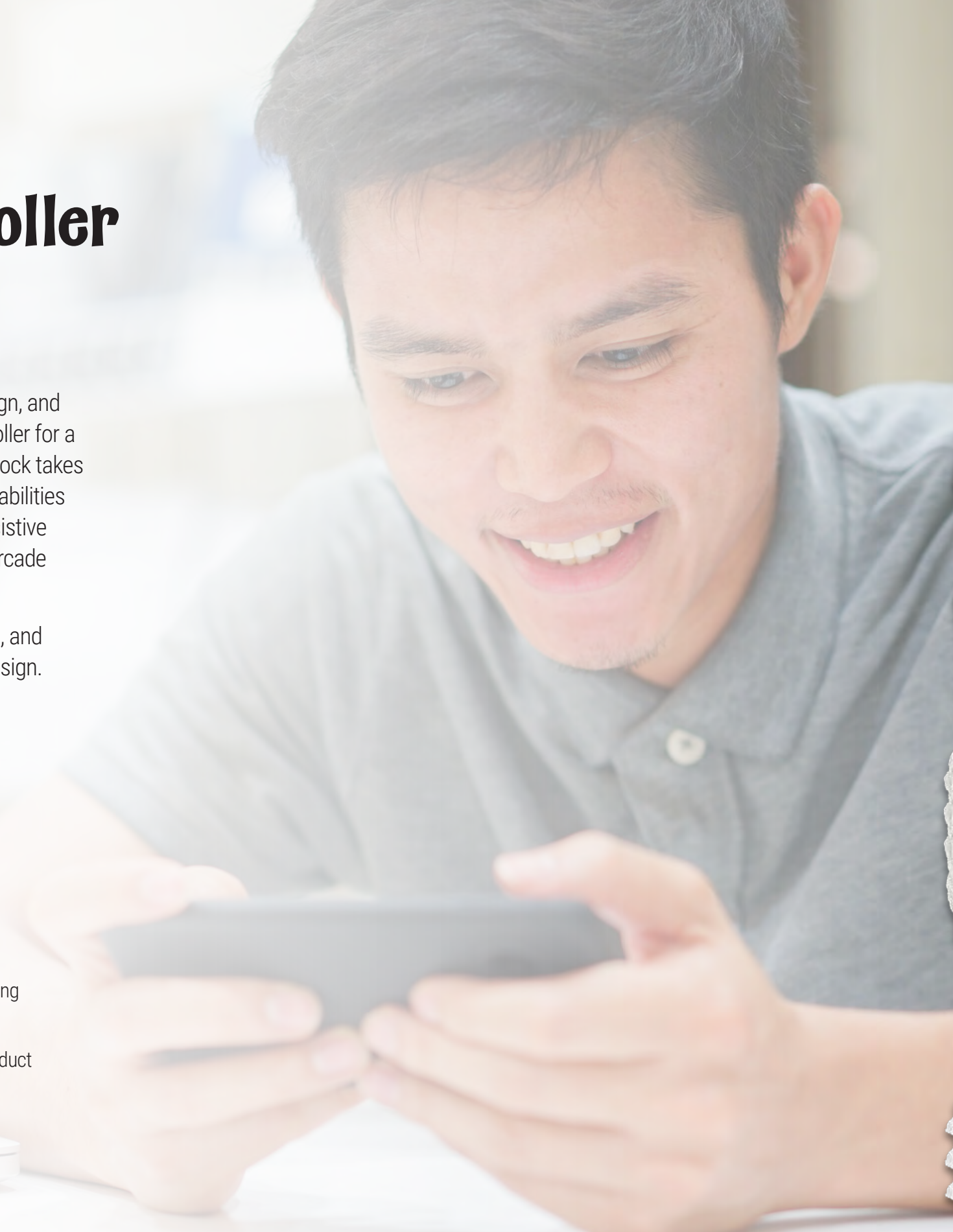
Grade Bands: 3-5, 6-8, 9-12

    Primary Focus: Engineering, Programming

    Secondary Focus: ELA, Communication

    Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: Makey Makey, littleBits, Sparkfun, 3D printer

Related Industry Sectors: Scientific Research & Engineering; Manufacturing & Product Development

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Here is a sample content standard for this iBlock:

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundles:
- 3-5 Maker Bundle
- 6-8 Coder Bundle
- 6-8 Maker Bundle
- 9-12 MakerBundle

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

DESIGN CHALLENGES WITH LITTLEBITS

OTISpd.com/events/view/14139

Engineering for Hazardous Weather: Taking Flood Control to New Heights

DESCRIPTION:

When most people think about weather and climate, they immediately check the news or their favorite weather app. Is it going to rain today? Will there be flooding? With the threat of severe or hazardous weather, it is important to consider what we can do to protect ourselves, our homes, and our communities. With a focus on flooding, it is our mission to determine how best to protect and preserve resources, people, and communities during times of severe weather. How would you tackle the threat of a flood? In this iBlock, students will consider how and why floods form as well as specific areas of concern. Students will then engineer a lifted house or system to best prepare for, and protect people during severe flooding conditions.

FOCUS OF THE IBLOCK:

Grade Bands: 3-5

Primary Focus: Weather

Secondary Focus: Engineering

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: 3D printer

Related Industry Sectors: Engineering & Architecture

Here is a sample content standard for this iBlock:

Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. (3-ESS3-1)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:

Mobile STEM Bundle

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

MAKERBOT SKETCH BASICS
OTISpd.com/events/view/16412

Exploring Native American Culture

DESCRIPTION:

Geography plays an important role in how people live, beginning by influencing which communities occupy given areas. As Native American communities began to settle and adapt to their environment, they were challenged by climate and terrain conditions, such as dry land, extreme cold, or high mountain ranges, as well as natural resources. As a result, they developed patterns of behavior. Some groups resorted to behavioral patterns such as migration, while other Native American groups chose to use the land and resources around them to structure more permanent homes. In this iBlock, students will explore how geography influenced the lives of different Native American communities. Then they will design and construct a redesigned model of a Native American home structure.

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
Mobile STEM Bundle

www.mobilestemcarts.com

FOCUS OF THE IBLOCK:

Grade Bands: 3-5

Primary Focus: Social Studies

Secondary Focus: Engineering

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: 3D printer

Related Industry Sectors: Engineering & Architecture

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

TEACHING WITH TINKERCAD
OTISpd.com/events/view/16268

iBlocks Topic

Fashion for Function: Smart Wearables

DESCRIPTION:

Wearable technology has changed quite drastically since the first items hit stores. Some of the most drastic changes and innovations in "smart" wearables have been focused on making them aesthetically pleasing while also serving a purpose, whether that's fashion, health, or entertainment. In this iBlock, students will design a unique piece of wearable technology that fulfills a function. Who knows — maybe one day it will climb to the top of gift idea lists!

FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: Design, Fabrication

Secondary Focus: Art, Marketing

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: micro:bit, Makey Makey

Related Industry Sectors: Fashion & Design; Marketing, Sales & Services

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Here is a sample content standard for this iBlock:

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (Next Generation Science Standards, MS-ETS1-2)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
Mobile STEM Bundle

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

INTRO TO MICRO:BIT
OTISpd.com/events/view/13954

iBlocks Topic

Financial Literacy

DESCRIPTION:

You may have heard it said before, but it's never too early to start preparing for your financial future. In this iBlock, students will explore key concepts in personal finance and map out a plan to give them a secure financial future. Tasks include creating a budget, preparing savings and credit accounts, building an investment portfolio, and presenting the final product.

FOCUS OF THE IBLOCK:

Grade Bands: 9-12

Primary Focus: Economics and Financial Literacy

Secondary Focus: Future Readiness

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Related Industry Sectors: Finance, Business

Here is a sample content standard for this iBlock:

Spending 12-9: Having an organized system for keeping track of spending, savings, and investments makes it easier to make financial decisions.

www.iBlocks.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

MICROSOFT EXCEL
OTIS.teq.com/events/view/28/14877

iBlocks Topic

Geometric Self-Watering Planter

DESCRIPTION:

Are you looking for a creative, project-based way to teach your students about computer-aided design? In this iBlock, students will construct a geometric self-watering planter in Tinkercad. This project will utilize advanced skills in CAD software and challenge students to think mathematically while designing.

FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: CAD

Secondary Focus: Geometry

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: 3D printer, laser cutter, micro:bit

Related Industry Sectors: Agriculture, Food & Natural Resource; Marketing, Sales & Services

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Here is a sample content standard for this iBlock:

6-7.G Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
Mobile STEM Bundle

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators** (OTISpd.com).

GLOWFORGE BASICS
OTISpd.com/events/view/15981

iBlocks Topic

Growing a Hydroponic Garden

DESCRIPTION:

Agriculture has always been one of the building blocks of human civilization. Humanity has changed a lot since civilization first began, and that includes the way we grow our plants. In this iBlock, students will explore different agricultural structures and incorporate emerging resources to cultivate a technologically enhanced botanical space. Students will also tackle challenges like growing plants in space-conscious environments for a rapidly growing population, and together discover the future of sustainable gardening.

FOCUS OF THE IBLOCK:

Grade Bands: 9-12

Primary Focus: Ecology, Programming

Secondary Focus: Engineering, Botany

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: Farmshelf, pi-top 4

Related Industry Sectors: Agriculture, Food & Natural Resource

Here is a sample content standard for this iBlock:

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. (HS-ESS3-4)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:

9-12 Maker Bundle

www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

INTRO TO MICRO:BIT
OTISpd.com/events/view/13954

Light and Shadow

DESCRIPTION:

The Earth-Sun-Moon system impacts our tides, seasons, and perceptions of time. In ancient times, engineers created some of the very first tools to measure time, including the sundial. In this iBlock, students will be challenged to design their own device to track time. Using CAD software, they will first design, and then 3D print, their device.
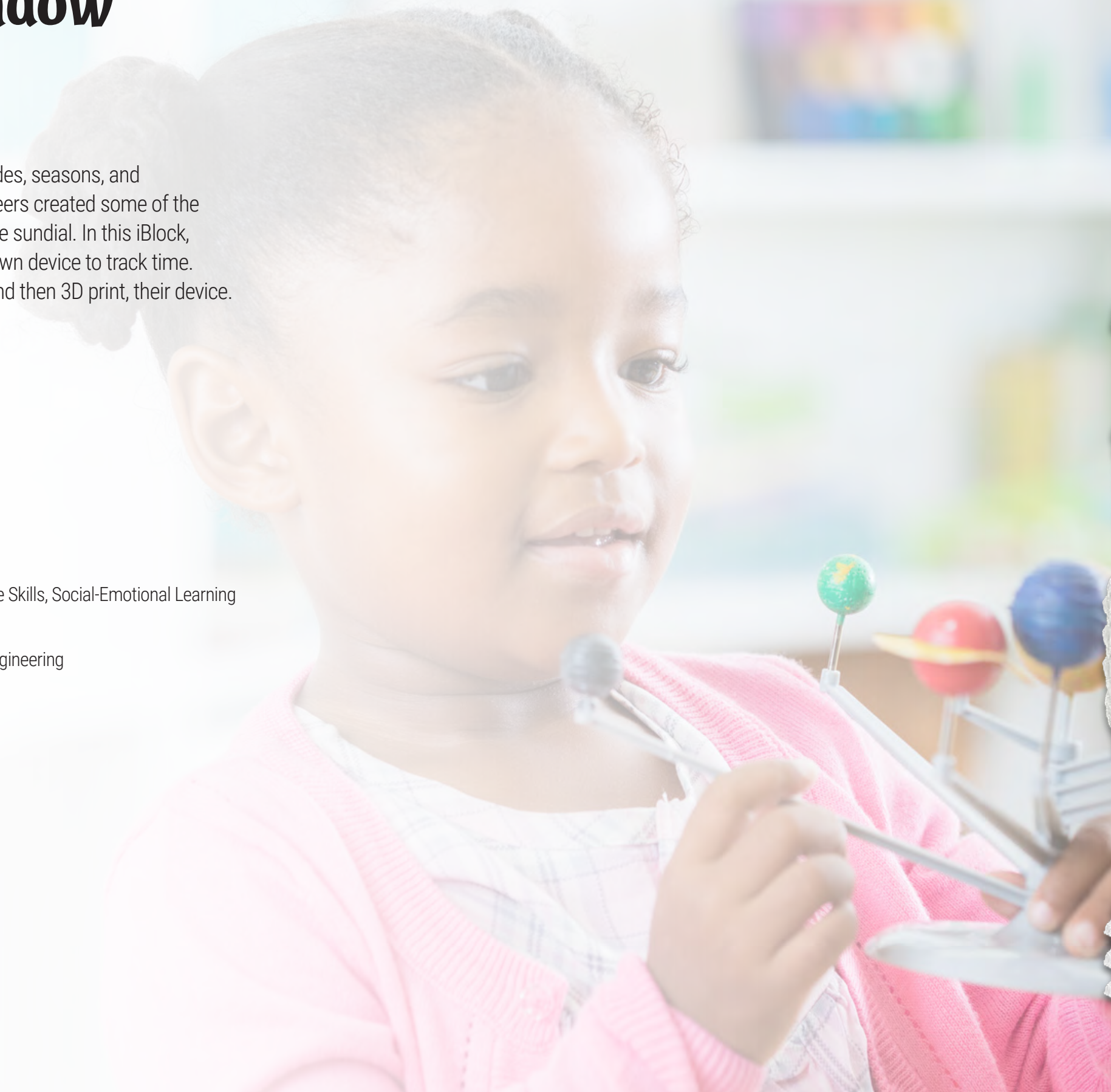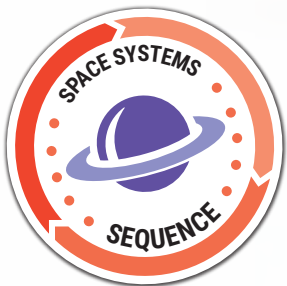
FOCUS OF THE IBLOCK:

Grade Bands: 3-5

Primary Focus: Astronomy, 3D printing

Secondary Focus: Engineering

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: 3D printer

Related Industry Sectors: Scientific Research & Engineering

SPACE SYSTEMS
SEQUENCE

Here is a sample content standard for this iBlock:

Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. (5-ESS1-2)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:

Mobile STEM Bundle
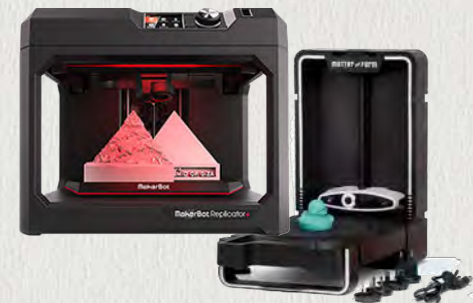
www.mobilestemcarts.com

Need reinforcement? Subscribe to our online platform **OTIS for educators (OTISpd.com).**

MAKERBOT REPLICATOR+ BASICS

OTISpd.com/events/view/13953

Mars Colony: Engineering Expedition

DESCRIPTION:

The year is 2050 and humankind is getting ready to take the next great step in space exploration - a colony on Mars! Intrepid individuals with skills in various STEAM areas are called to assist in planning and building the future colony and the most daring of them will live there as the very first Martians! In this iBlock, students will research space exploration, Mars, and survival essentials before planning for an historic trip to populate a new planet. Students will need to plan and build solutions for the essentials - food, transport, communication and more. Together, we can bring humanity to the next stage of its development.

FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: Engineering, Social Studies

Secondary Focus: Biology, ELA

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: Sphero RVR, littleBits, Sparkfun, SAM Labs

Related Industry Sectors: Scientific Research & Engineering; Information & Communication Technology; Transportation

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Here is a sample content standard for this iBlock:

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (MS-ETS1-1.)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundles:
- MS Maker Bundle
- MS Code Bundle

www.mobilestemcarts.com

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USING SPHERO TO ENHANCE MIDDLE SCHOOL SCIENCE LESSONS

OTISpd.com/events/view/14092

Mars Colony: Engineering Expedition with LEGO® SPIKE™ Education

Here is a sample content standard for this iBlock:

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

DESCRIPTION:

It is the not-too-distant future and humankind is getting ready to take the next great step in space exploration: a colony on Mars! In this iBlock, students will research space exploration, Mars, and survival essentials before planning for a historic trip to populate a new planet. Students will need to plan and build solutions for the essentials using LEGO. This will include building a habitat, transportation, utility robots, and more. Together with LEGO, students can bring humanity to the next era of its development.

Pair your iBlock with the companion **STEM product** to ensure you have what you need to effectively implement your iBlock:

LEGO Kit:

LEGO® SPIKE™ Prime Kit

FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: Engineering, Social Studies

Secondary Focus: Math, Communication

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Required Technologies: LEGO Education SPIKE Prime kit

Related Industry Sectors: Scientific Research & Engineering; Information & Communication Technology; Transportation; Aviation/Space

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LEGO SPIKE PRIME BASICS
OTIS.teq.com/events/view/16653

No Poverty and Zero Hunger

DESCRIPTION:

When the United Nations created its Sustainable Development Goals in 2015, they stressed the importance of addressing world poverty and hunger. The first goal aims to eliminate poverty, while the second goal aims to end hunger, achieve food security, and promote sustainable agriculture. In this iBlock, students will work to help the UN achieve these goals by designing a window planter that will produce low-cost, high-yield crops in the most efficient manner possible.

FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: STEM

Secondary Focus: Math

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Related Industry Sectors: Agriculture, Food & Natural Resources

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Here is a sample content standard for this iBlock:

Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (Next Generation Science Standards, MS-LS2-5)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
Mobile STEM Bundle

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REPRESENTING DATA IN CHARTS
OTISpd.com/events/view/13900

iBlocks Topic

Programming a Classification System

DESCRIPTION:

It's crucial that today's students become fluent in computer science skills and concepts. In this iBlock, students will build their computer science fluency as they conduct research on a topic of their choosing and develop a fully functional coding application to help them gain a better understanding of their research. Students will utilize computer programming software to go through the process of finding, organizing, classifying, and presenting research. In addition, students will create a visual and written plan for the logic of their program and create a fully functional program that takes user input and answers the student's original question.

FOCUS OF THE IBLOCK:

Grade Bands:

3-5: Coding and Classifying: Ready, Set, Sort!

6-8: Super Sort: Classifying with Code!
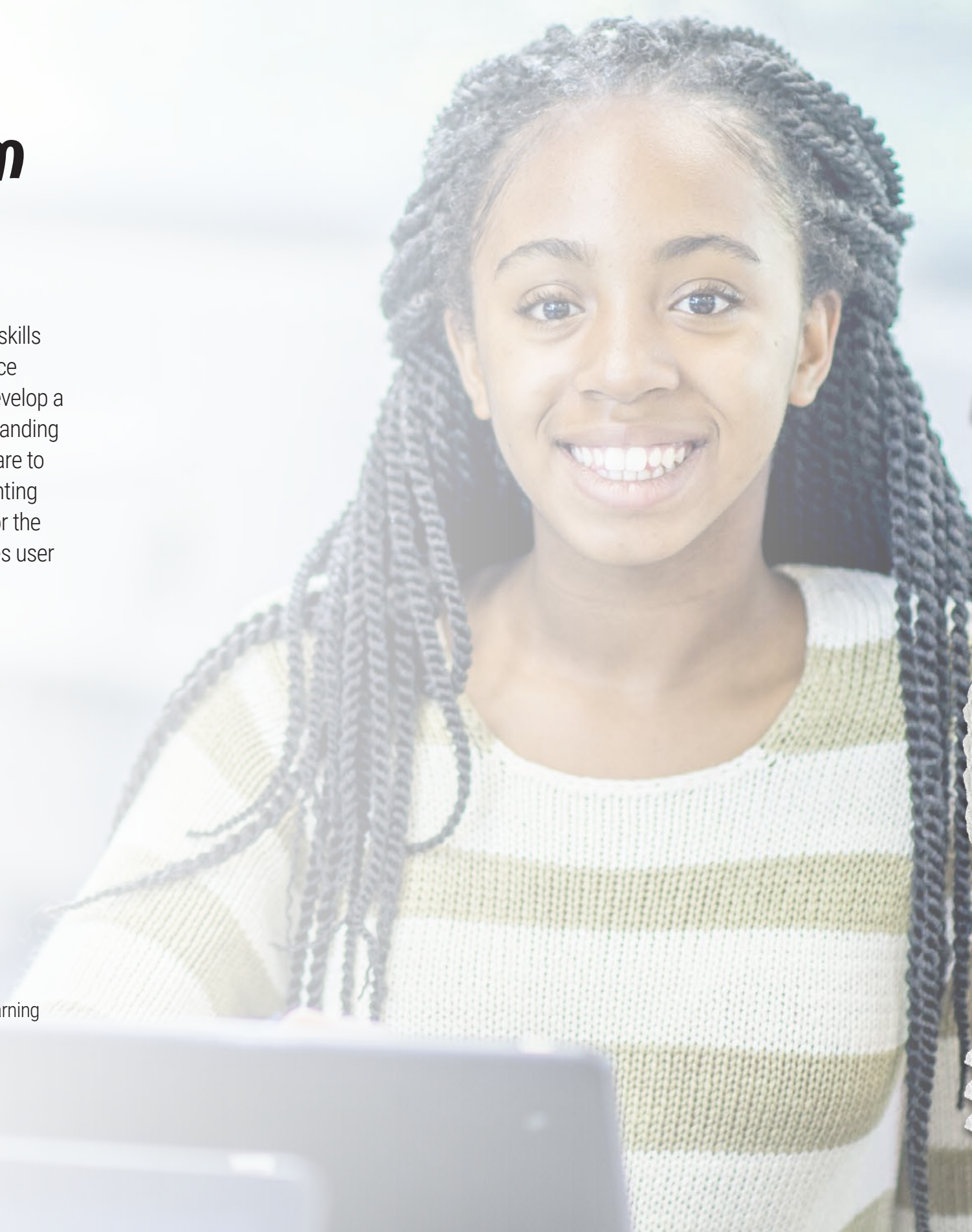
9-12: Coding a Classification System

Primary Focus: Physical Computing and Computer Programming

Secondary Focus: Critical Thinking and Problem Solving

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: Piper, pi-top

Related Industry Sectors: Information & Communication Technologies

Here is a sample content standard for this iBlock:

Design a solution to a complex real-world problem by breaking itdown into smaller, more manageable problems that can be solved through engineering. (HS-ETS1-2)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundles:
- 3-5 Coding Bundle
- 6-8 Coding Bundle
- 9-12 Coder Bundle
- 9-12 Maker Bundle

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LEARNING PYTHON WITH PI-TOP: DATA TYPES

OTISpd.com/events/view/13983

iBlocks Topic
Prosthetics

DESCRIPTION:

Technology and design have had a major impact on the function of modern-day prosthetics. They've also served to make prosthetics more accessible. In this iBlock, students will navigate through the engineering design process to design and develop a prosthetic device. To complete this task, students will explore 21st century skills such as critical thinking, innovation, and collaboration. Solutions can include computer-aided design (CAD), 3D printing, circuitry, and more.

FOCUS OF THE IBLOCK:

Grade Bands: 9-12

Primary Focus: Design, Fabrication, and Engineering

Secondary Focus: STEM and Problem Solving

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: 3D printer

Related Industry Sectors: Medical Technology, Scientific Research and Engineering

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Here is a sample content standard for this iBlock:

Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. (HS-ETS1-3)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
Mobile STEM Bundle

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MANAGING 3D PRINT QUEUES
OTISpd.com/events/view/13931

Reimagining Public Transportation

DESCRIPTION:

Millions of people around the United States take a train to work each day. Some of these commuters live a short distance from their destination, but many travel over an hour just to get to work! Can you imagine a workweek where a minimum of 2 hours each day is spent commuting? As the number of people commuting only continues to grow, innovators are continually seeking to make transportation more efficient by building faster trains that can carry more passengers. In this iBlock, students will develop an understanding of efficiency by building their own model train, capable of either going faster, or carrying more weight than their peers.

FOCUS OF THE IBLOCK:

Grade Bands: 3-5

Primary Focus: Forces and Interactions

Secondary Focus: Engineerings

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: littleBits, Sphero, 3D printer

Related Industry Sectors: Transportation

Here is a sample content standard for this iBlock:

Plan and conduct an investigation to provide evidence of the effects of balance and unbalanced forces on the motion of an object. (3-PS2-1)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
3-5 Maker Bundle

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LET'S GET ROLLING WITH LITTLEBITS
OTISpd.com/events/view/14186

River Management: Assessing Health

DESCRIPTION:

What's in the water? The world's rivers and streams are a priceless resource, but various forms of pollution pose a threat to water quality. Scientists carry out studies to determine physical, chemical and biological characteristics of water to get an accurate understanding of water quality. It's critical that we know the current status of water-quality conditions and how and why those conditions have been changing over time. With a better understanding of water quality, the growing need to protect the world's water resources may be better understood. So how do scientists assess whether river ecosystems are being protected? What does it entail to study a river's "health"? In this iBlock, students will engineer a device or system that will sample an environmental parameter that indicates water health.

FOCUS OF THE IBLOCK:

Grade Bands: 3-5

Primary Focus: Science

Secondary Focus: Social Studies

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: Labdisc

Related Industry Sectors: Scientific Research & Engineering; Agriculture & Natural Resources; Energy, Environment, & Utilities

Here is a sample content standard for this iBlock:

Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment. (5-ESS3-1)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
3-5 Maker Bundle

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ENGAGING IN CITIZEN SCIENCE
OTISpd.com/events/view/14172

Robotic Amusement Park

DESCRIPTION:

For over 100 years, amusement parks have garnered the love of many families through their incredible rides. In this iBlock, students will research various amusement park rides so that they can design and build their own dream ride. Along the way, they'll test their design and make improvements. Finally, the students will get their creations ready for their grand debut, and even bring their rides together to create a class theme park.
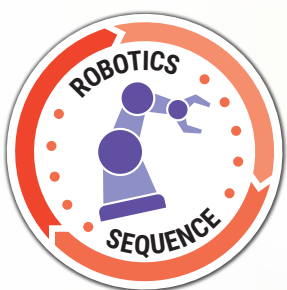
FOCUS OF THE IBLOCK:

Grade Bands: 6-8

Primary Focus: STEM

Secondary Focus: Physics

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: littleBits, Ozobot, Sparkfun, Sphero

Related Industry Sectors: Scientific Research & Engineering; Information Technology; Manufacturing & Product Development

Here is a sample content standard for this iBlock:

A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (Next Generation Science Standards, MS-ETS1-4)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundles:

- 6-8 Robotics Bundle
- Robotis DREAM Classroom Bundle

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ROBOTIS DREAM SERIES
OTISpd.com/events/view/14172

Robotic Assembly Line

DESCRIPTION:

During the Industrial Revolution, assembly lines greatly improved manufacturing efficiency and in turn, production capacity. We are now in a new age of advanced technology and once again manufacturing is changing — but this time because of robotics, not a new manufacturing framework. In this iBlock, students will learn about the history of assembly lines, the future of assembly lines, and then build a robot to function in an assembly line environment.

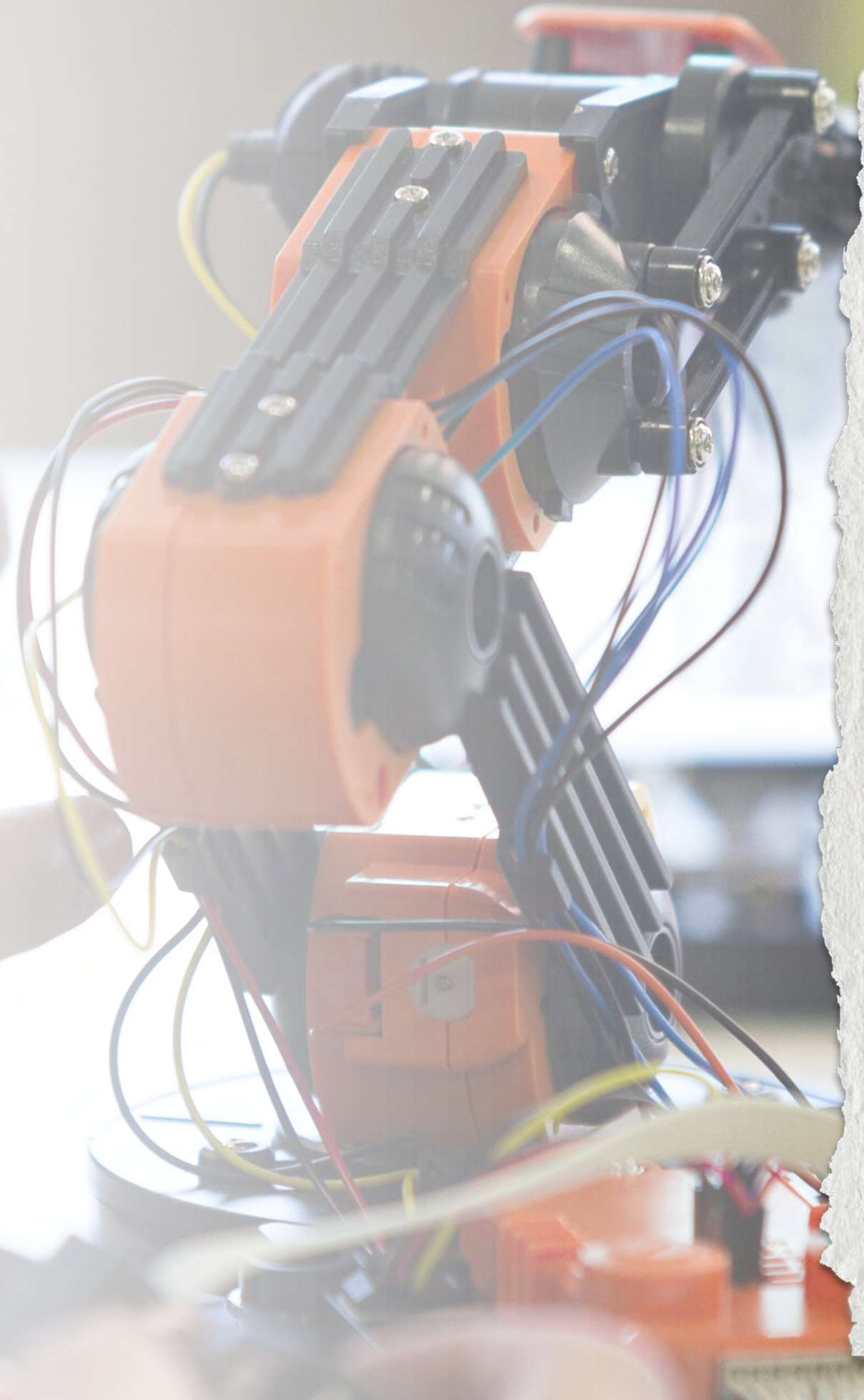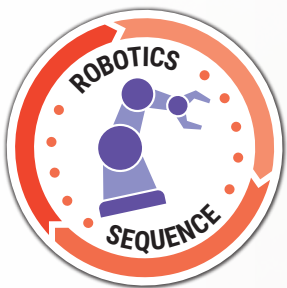## FOCUS OF THE IBLOCK:

Grade Bands: 9-12

Primary Focus: Robotics

Secondary Focus: Engineering

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: ROBOTIS STEM, Sparkfun, Sphero RVR, UBTECH

Related Industry Sectors: Scientific Research & Engineering; Manufacturing & Product Development

Here is a sample content standard for this iBlock:

Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features. (1B-AP-12)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundles:

- 6-8 Robotics Bundle
- Robotis DREAM Classroom Bundle

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ROBOTIS DREAM SERIES
OTISpd.com/events/view/14172

Robotic Field Day

DESCRIPTION:

In our technologically advanced society, we can now program robots to compete for us! Students will show off the very best of this new age of technology while learning about the importance of the past. In this iBlock, students will research the history of sporting events and create robots to compete in specific games for their very own futuristic robotic field day!

## FOCUS OF THE IBLOCK:

Grade Bands: 3-5, 6-8, 9-12

Primary Focus: Robotics

Secondary Focus: Engineering

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: ROBOTIS Kits, Sparkfun, UBTECH, 3D printer, Cubelets

Related Industry Sectors: Scientific Research & Engineering; Information & Communication Technologies; Hospitality, Tourism, & Recreation
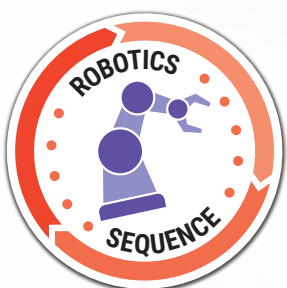
Here is a sample content standard for this iBlock:

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.(3-5-ETS1-1)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundles:
- K-5 Robotics Bundle
- 6-8 Robotics Bundle

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CUBELETS BASICS
OTISpd.com/events/view/13974

Rube Goldberg Machines

DESCRIPTION:

Rube Goldberg Machines accomplish a simple task through an elaborately humorous and overcomplicated method. In this iBlock, challenge your students to think outside the box and discover the unexpected kinetic properties in everyday objects as they design their own Rube Goldberg Machine. In order to build their contraption, students will research simple machines and chain reactions and how they both relate to the world around them. From ideation to interaction, students will engage in creative thinking, critical reasoning, and teamwork as they engineer these truly unique machines.

FOCUS OF THE IBLOCK:

Grade Bands: 3-5, 6-8, 9-12

Primary Focus: Problem Solving and engineering (ES, MS) / Engineering and Physics (HS)

Secondary Focus: Design and ELA (ES, MS) / ELA and Business (HS)

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: littleBits, Cubelets, Sphero, 3D printer, etc.

Related Industry Sectors: Scientific Research & Engineering; Arts, Media, & Entertainment

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Here is a sample content standard for this iBlock:

Make observations to provide evidence that energy is conserved as it is transferred and/or converted from one form to another. (4-PS3-2.)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundles:
- 3-5 Maker Bundle
- K-5 Robotics Bundle

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RUBE GOLDBERG MACHINES IN THE CLASSROOM

OTISpd.com/events/view/16459

Storytelling Through the Ages

DESCRIPTION:

Storytelling has been around for centuries — it is a fundamental part of being human and an essential learning tool. Our ancestors would tell stories that were passed down from generation to generation with nothing more than their imaginations. Now, we are still telling the same stories, but in new and innovative ways that both speak to our past and look forward to the future. Students will develop a new story and work through the process of storyline creation, character development, narrative arc, developing props & visuals, and presenting their final product. Finally, students will bring storytelling into the 21st century by coding a robot or program to tell their story!

FOCUS OF THE IBLOCK:

Grade Bands: 3-5

Primary Focus: ELA, Writing

Secondary Focus: Computer Science/Coding; Art

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: Sphero Bolt, Wonder Workshop (Dash and Dot)

Related Industry Sectors: Arts, Media, & Entertainment; Information Technology

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Here is a sample content standard for this iBlock:

Engage effectively in a range of collaborative discussions with diverse partners; express ideas clearly and persuasively, and build on those of others. (Next Generation ELA Standards, 3-5SL1.)

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundles:
- 3-5 Coding Bundle
- 3-5 Coding Bundle

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DIGITAL STORYTELLING AROUND THE CAMPFIRE WITH SPHERO

OTISpd.com/events/view/13953

iBlocks Topic

Tiny Houses

DESCRIPTION:

With the world population estimated at around 7.7 billion, concerns rise over issues like housing, natural resource use, and environmental impact. Tiny houses have emerged as a movement and potential solution to mitigate our demands on energy consumption and our lifestyle footprint. Throughout this iBlock, students will explore energy consumption and efficiency, identify ways in which tiny homes can address efficiency concerns, design and engineer a tiny home solution model, and present their models at their very own home show.

FOCUS OF THE IBLOCK:

Grade Bands: 3-5, 6-8, 9-12

Primary Focus: Sciecne (ES), STEM (MS)

Secondary Focus: Math and Engineering (ES), Human Impacts and Engineering (MS)

Additional Foci: Advanced Literacy, Transferable Skills, Social-Emotional Learning

Possible Suggested Technologies: littleBits STEAM Kit, 3Doodler, Squishy Circuits

Related Industry Sectors: Engineering & Architecture; Marketing, Sales, & Services

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Here is a sample content standard for this iBlock:

Obtain and combine information from books and other reliable media to explain phenomena [4-ESS3-1].

Pair your iBlock with the companion **STEM product bundle** to ensure you have what you need to effectively implement your iBlock:

STEM Bundle:
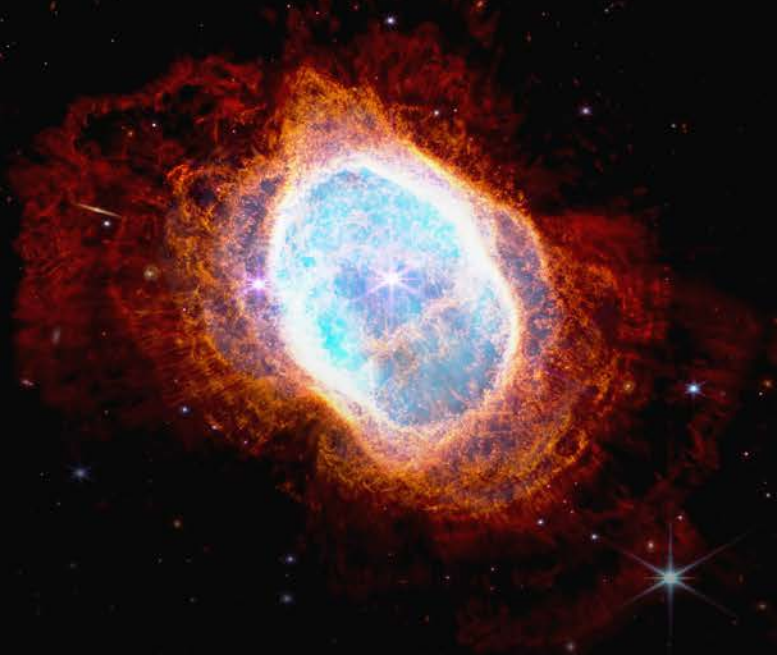Mobile STEM Bundle

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TEACHING WITH TINKERCAD
OTISpd.com/events/view/13883

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