

ACADEMIC FRAMEWORKS ADDRESSED WITH KIBO ROBOTICS WORK

The KIBO curricula are designed to address all elements of the **STEAM** framework: **S**cience, **T**echnology, **E**ngineering, **L**iberal **A**rts and **M**athematics. The following frameworks relate to the STEAM disciplines:

Disciplinary Content Area	Learning Frameworks and Standards
Science	Next Generation Science Standards (NGSS)
Technology	K-12 Computer Science Framework (K12 CS)
Engineering	International Technology and Engineering Educators Association (ITEEA)
Liberal Arts	Common Core Framework
Mathematics	Common Core Framework

Common Core Connections

This curriculum is designed to address the Common Core Framework by fostering many of the foundational math, reading, and language skills that are commonly taught in early childhood classrooms. The Common Core framework is “a set of standards that were created to ensure that all students graduate from high school with the skills and knowledge necessary to succeed in college, career, and life, regardless of where they live” (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). Find out more about Common Core here:

<http://www.corestandards.org/>

Curricular Activity	Common Core Standards Addressed
“Technology Circle” and other group discussions	<p>In technology circle time and during group work, children practice their speaking skills as they recount their experiences, share facts, and ask questions about one another’s work.</p> <p>CCSS.ELA-LITERACY.SL.2.1- Participate in collaborative conversations with diverse partners about <i>grade 2 topics and texts</i> with peers and adults in small and larger groups</p> <p>CCSS.ELA-LITERACY.SL.2.4- Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences</p>

<p>Research problems and use the engineering design process to create robotic solutions</p>	<p>When designing robotic solutions to human problems, children explore research, scoping problems, and comparing designs.</p> <p>CCSS.ELA-LITERACY.RI.2.10- By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 2-3 text complexity band proficiently, with scaffolding as needed</p> <p>CCSS.ELA-LITERACY.RL.2.7- Use information gained from the illustrations and words in a print or digital text to demonstrate understanding</p> <p>CCSS.ELA-LITERACY.W.2.7- Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations</p> <p>CCSS.ELA-LITERACY.W.2.8- Recall information from experiences or gather information from provided sources to answer a question</p>
<p>Programming with sensors and conditional statements</p>	<p>When programming, children practice with sequence, order, counting, number sense, and estimation.</p> <p>CCSS.MATH.CONTENT.2.OA.B.2- Fluently add and subtract within 20 using mental strategies</p> <p>CCSS.MATH.CONTENT.2.MD.D.9- Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object</p>

ITEEA Standards and K-12 Computer Science Framework Connections

KIBO curriculum is also designed to align with standards from the [International Technology and Engineering Educators Association \(ITEEA\)](#) guidelines as well as the [K-12 Computer Science Framework \(K12 CS\)](#). ITEEA is a professional organization for technology, design, and engineering educators that promotes technological literacy by supporting the teaching of technology in schools. The K12 CS Frameworks is a set of guidelines developed researchers and educators that informs the development of standards, curriculum, course pathways, and professional development in the US. Both of these guidelines are intended highlight core competencies specifically in areas of computer science and engineering education. Both ITEEA standards and K12 CS standards offer recommendations for specific concepts and skills that children should master prior to the end of grade 2.

ITEEA and K12 CS Standards Addressed

Powerful Idea	ITEEA Standard	K12 CS Practices and Concepts
Engineering Design Process	<ul style="list-style-type: none"> - People plan to help get things done. (Std 2E; K-2) - Everyone can design solutions to a problem. (Std 8A; K-2) - Design is a creative process (that leads to useful products and systems). (Std 8B; K-2/Std 8C) - The engineering design process includes identifying a problem, looking for ideas, developing solutions, and sharing solutions with others. (Std 9A; K-2) - Asking questions and making observations helps a person to figure out how things work. (Std 10A; K-2) - Troubleshooting is a way of finding out why something does not work so it can be fixed. (Std 10C; Gr 3-5) 	<p>-Troubleshooting: Computing systems might not work as expected because of hardware or software problems. Clearly describing a problem is the first step toward finding a solution. (Grade 2-Computing Systems)</p>
Robotics	<ul style="list-style-type: none"> -Build or construct an object using the design process. (Std 11B; K-2) -Discover how things work. (Std 12A; K-2) 	<p>A computing system is composed of hardware and software. Hardware consists of physical components, while software provides instructions for the system. These instructions are represented in a form that a computer can understand (Grade 2-Hardware and Software)</p>
Programming	<ul style="list-style-type: none"> -Recognize and use everyday symbols (Std 12C; K-2) -People use symbols when they communicate by technology (Std 17C; K-2) 	<p>Computing devices interpret and follow the instructions they are given literally (Grade 2-Devices)</p> <p>People follow and create processes as part of daily life. Many of these processes can be expressed as algorithms that computers can follow (Grade 2-Algorithms)</p>

	-The study of technology uses many of the same ideas and skills as other subjects. (Std 3A; K-2)	
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Next Generation Science Standards (NGSS)

The [Next Generation Science Standards](#) (NGSS) are a set of research-based science content standards that were designed to set the expectations for what students should know and be able to do in K-12. These standards give local educators the flexibility to design classroom learning experiences that stimulate students’ interests in science and prepares them for further education and careers down the road. The NGSS standards offer recommendations for specific concepts and skills that children should master prior to the end of grade 2. The NGSS were developed by states to improve science education for all students.

Individual lessons with KIBO may integrate specific scientific content: for example, decorating and programming a KIBO to look and behave like a particular animal will engage with core ideas in the NGSS Life Sciences discipline.

Regardless, all curricular work with KIBO engages with the following NGSS K-2 Engineering standards:

K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
K-2-ETS1-2	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.