



**STEM Innovations 6**

**Curriculum**

**June 2026**

# Unit A: Google for Education: Applied Digital Skills

**Enduring Question: How do the basic programs of Google Workspace make school and personal life more efficient?**

**Timeframe:** About 8 classes - 40 minutes each

## Mandatory Resources:

- Desktop Computer and Promethean Board
- Chromebooks
- Google for Education: Applied Digital Skills Website/Lessons and Handouts

## Academic Vocabulary:

- Theme: An option that allows you to customize the colors and appearance of a form or other digital project.
- Spreadsheet: A digital document that can be used for storing data, completing calculations, and analyzing information.
- Column: A vertical set of cells in a spreadsheet.
- Row: A horizontal set of cells in a spreadsheet.
- Cell: A small box in a spreadsheet in which a single piece of data, such as a letter or number, is entered.
- Conditional formatting: A spreadsheet function that lets you change the text style or background color of cells, rows, or columns if they meet certain conditions.
- Cell reference: The “address” of a cell, indicated by its column and row.
- Gradient color: Uses shades of a color for a background.
- Brainstorm: A process used by groups of people to quickly come up with ideas.
- Comment: A note that can be added to a document. Collaborators will be able to respond to a comment.
- Slide: A single unit of a presentation. When the presentation is presented, viewers will see one slide at a time.
- Slideshow mode: A way of previewing your presentation the way viewers will see it.
- Pixel art: A type of digital art made of a series of colored dots called pixels that together make up a larger image.
- Browser tab: A small, clickable area at the top of a computer window that allows for multiple web pages to be open at the same time.
- Gridlines: Lines that form the cells, rows, and columns in a spreadsheet grid.
- Vision board: A collection of inspiring photos, words, and shapes that reminds someone of the areas of life they want to focus on or improve.
- Canvas: A blank space for creating a visual design.
- Word art: A tool for adding stylized letters to a digital project.
- Align: Neatly arrange elements in your design.

| Big Idea                                                                                    | Content                                                                                                                                                                                                                                                                                                   | Objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Activities/Strategies                                                                                                                                                               | Assessment                                                                                                                              | Standards                                                                                                                                                                                                                                              |
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| How do the basic programs of Google Workspace make school and personal life more efficient? | <ul style="list-style-type: none"> <li>• Students will complete the lessons and activities on the Google for Education: Applied Digital Skills website to introduce and further the learning and comprehension of features in Google Forms, Google Sheets, Google Drawings, and Google Slides.</li> </ul> | Students will be able to: <ul style="list-style-type: none"> <li>• Design a logo that describes their identity using Google Drawings.</li> <li>• Format a spreadsheet to create a digital guessing game.</li> <li>• Understand how conditional formatting affects spreadsheet behavior.</li> <li>• Identify cell references in a spreadsheet by playing their game with a partner.</li> <li>• Select areas of your life that they would like to focus on or improve.</li> <li>• Add visual elements, words, and shapes to their vision board that support their vision or goal.</li> </ul> | <ul style="list-style-type: none"> <li>• Use the Google for Education: Applied Digital Skills website with video tutorials, lessons, and individual student Chromebooks.</li> </ul> | <ul style="list-style-type: none"> <li>• Observation and questioning</li> <li>• Completion of individual lessons/assessments</li> </ul> | ISTE Standards <ul style="list-style-type: none"> <li>• 1.1</li> <li>• 1.2</li> <li>• 1.3</li> <li>• 1.4</li> <li>• 1.5</li> <li>• 1.6</li> </ul> STEELS Standards <ul style="list-style-type: none"> <li>• TE.6–8.T.A</li> <li>• ETS.6–8.E</li> </ul> |

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|  |  | <ul style="list-style-type: none"><li>• Make design choices that are unique to their vision board and that will inspire them.</li><li>• Understand how a vision board could help them stay motivated toward achieving their goals.</li><li>• Create a spreadsheet pixel art project that uses conditional formatting rules to assign cell and text colors to specific values.</li><li>• Explain how to set conditional formatting rules to call attention to specific information in a spreadsheet.</li><li>• Understand there are different ways to organize, display, and analyze data with formatting.</li><li>• Recognize conditional formatting as a tool for visually organizing spreadsheet data for easier reference and improved usability.</li><li>• Complete creative projects as a fun, effective way to learn advanced app features and digital skills.</li></ul> |  |  | <ul style="list-style-type: none"><li>• ETS.6–8. CS</li></ul> |
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## Unit B: Hummingbird Robotics

**Enduring Question: How does hardware and software work together to solve problems and create solutions?**

**Timeframe:** About 16 classes - 40 minutes each

### Mandatory Resources:

- Desktop Computer and Promethean Board
- Chromebooks
- Hummingbird Robotics Kits
- Birdbrain Technologies Website
- Snap! Programming Website
- Various Building Materials and Supplies
- Handouts

### Academic Vocabulary:

- Programming/Coding: The process of writing instructions (code) that the micro:bit and Hummingbird can execute.
- Algorithm: A step-by-step set of rules or instructions designed to perform a specific task (e.g., the code sequence to make an arm wave).
- Block-Based Coding: A visual method of programming where instructions are represented by graphical blocks that snap together, replacing text-based syntax.
- Micro:bit: The small, programmable computer board that acts as the "brain" for the Hummingbird Bit system.
- Input: Data or signals received by the micro:bit from the environment, usually through sensors (e.g., light level, sound level).
- Output: The information or action produced by the micro:bit/Hummingbird, usually through actuators (e.g., an LED lighting up, a motor spinning).
- Conditional Statement (If/Then/Else): A fundamental control flow structure where a specific block of code is executed only if a given condition is true.
- Loop (Iteration): A sequence of instructions that is continually repeated, either a specific number of times (for loop) or indefinitely (forever loop).
- Variable: A storage location defined by a name that holds a specific piece of data that can be changed by the program (e.g., storing the current light level).
- Debugging: The process of identifying and correcting errors (or "bugs") in computer code or the physical wiring of the robot.
- Automation: Using a program to make a system (the robot) operate and perform tasks with minimal or no human intervention.
- Physical Computing: Building interactive physical systems by using software and hardware that can sense and respond to the real world.
- Robot: A machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer.
- Sensor: A device that detects and measures a physical property (like light, distance, or sound) and converts it into an electrical signal (input).
- Light Sensor: Measures the intensity of ambient light.
- Distance Sensor: Measures the distance to an object.
- Sound Sensor: Measures the volume or presence of sound.
- Dial/Rotary Sensor: Measures the rotational position of a knob.
- Actuator: A component of a machine that controls a mechanism or system (e.g., motors and LEDs are actuators for the Hummingbird).
- Motor: An electrical device that converts electrical energy into mechanical energy (motion).
- Position Servo (Standard Servo): A motor that can be programmed to move to and hold a specific angle.
- LED (Light Emitting Diode): A semiconductor light source that emits light when current flows through it.
- Tri-color LED: An LED capable of displaying different colors by mixing the intensities of Red, Green, and Blue light.
- Engineering Design Process (EDP): A non-linear, cyclical series of steps that engineers follow to find the best solution to a problem (Define, Design, Build, Test, Improve).
- Circuit: A complete and closed path through which electric current can flow.
- Terminal/Connector: The points on the Hummingbird board where components (sensors, motors, LEDs) are connected.

| Big Idea                                               | Content                                                                                                                | Objectives                                                                                                                                                        | Activities/Strategies                                                                                                               | Assessment                                                                                                                                 | Standards                                                                                                           |
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| <b>How does hardware and software work together to</b> | <ul style="list-style-type: none"> <li>• Students will complete the tutorials on the BirdBrain Technologies</li> </ul> | Students will be able to: <ul style="list-style-type: none"> <li>• understand and apply the fundamental principles &amp; concepts of computer science.</li> </ul> | <ul style="list-style-type: none"> <li>• Use the BirdBrain Technologies website and its resources to complete tutorials,</li> </ul> | <ul style="list-style-type: none"> <li>• Observation and questioning</li> <li>• Completion of individual tutorials and projects</li> </ul> | ISTE Standards <ul style="list-style-type: none"> <li>• 1.1</li> <li>• 1.4</li> <li>• 1.5</li> <li>• 1.6</li> </ul> |

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| <p><b>solve problems and create solutions?</b></p> | <p>website to program each component of a Hummingbird Bit Robotics Kit.</p> <ul style="list-style-type: none"> <li>Students will construct and program a robotic creation using the Hummingbird Robotics Kit, Micro:bit, Snap! Coding platform, and building materials.</li> </ul> | <ul style="list-style-type: none"> <li>gain practical experience of writing computer programs to solve problems.</li> <li>evaluate and apply information technology, including new or unfamiliar technologies analytically to solve problems</li> <li>be responsible, competent, confident and creative users of information and communication technology</li> <li>collaborate to complete a long-term project</li> <li>create a plan to use materials and supplies to create a robot</li> <li>construct a stable, aesthetically pleasing base for the robot</li> <li>use computational thinking to write a program to control the robot</li> <li>test and revise the robot</li> </ul> | <p>lessons, construction, and programming of robots.</p> |  | <ul style="list-style-type: none"> <li>1.7</li> </ul> <p>STEELS Standards</p> <ul style="list-style-type: none"> <li>ETS.6–8.E</li> <li>ETS.6–8.CS</li> <li>TE.6–8.K</li> </ul> |
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**Unit C: Spheros****Enduring Question: How do we translate complex problems into a language a machine can understand and execute?****Timeframe:** About 12 classes - 40 minutes each**Mandatory Resources:**

- 15 Sphero BOLT+ Robots
- Sphero BOLT+ Power Pack
- 15 Student iPads
- Various Building Materials and Supplies
- Sphero EDU App
- Sphero Central Website and Lessons

**Academic Vocabulary:**

- **Algorithm:** A step-by-step set of instructions designed to solve a problem or accomplish a task.
- **Code/Program:** A set of instructions written in a programming language (like Sphero Blocks or JavaScript) that a machine can execute.
- **Block Coding:** A visual programming environment where instructions are represented by interlocking blocks rather than written text.
- **Variable:** A named container that holds a value that can be changed within a program (e.g., a variable named speed).
- **Loop:** A control structure that repeats a set of instructions a specific number of times or until a condition is met.
- **Conditional Statement (If/Then):** A control structure that executes an instruction only if a specified condition is true (e.g., If the light sensor reads less than 10, Then turn on the LED).
- **Debugging:** The process of finding and fixing errors (or bugs) in the code or program.
- **Sequence:** The order in which instructions are executed by the robot.
- **Design Process:** A systematic approach used to develop solutions to problems, typically involving steps like defining the problem, brainstorming, prototyping, and testing.
- **Constraint:** A limitation or restriction on a design (e.g., time, available materials, or the Sphero's battery life).
- **Iteration:** The act of repeating a process (like testing and refining a design or code) to make improvements.
- **Calibration:** The process of precisely setting or checking a device's measurements (e.g., calibrating the Sphero's direction or stabilizing its compass).
- **Decomposition:** Breaking down a large, complex problem into smaller, more manageable sub-problems.
- **Sensor:** A device (like the light sensor or gyroscope) that detects and responds to some type of input from the physical environment.
- **Input:** Data received by the Sphero from the environment or the user (e.g., a tap, a light reading, or a code command).
- **Output:** The action or response generated by the Sphero based on the input or code (e.g., movement, color change on the LED matrix, sound).
- **Angle/Heading:** A measurement of rotation; the direction the Sphero is facing (often in degrees)
- **Speed/Velocity:** A measure of how fast the Sphero is traveling over a distance in a specific amount of time.
- **Distance:** The length of the path traveled by the Sphero.
- **LED Matrix:** The 8 x 8 grid of lights on the Sphero BOLT+ used to display animations, text, or data.

| Big Idea                                                                                          | Content                                                                                                                                                                  | Objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Activities/Strategies                                                                                                                                                                 | Assessment                                                                                                                               | Standards                                                                                                                                                                                                                                                          |
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| <b>How do we translate complex problems into a language a machine can understand and execute?</b> | <ul style="list-style-type: none"> <li>• Students will work in pairs to complete programming challenges and interactive lessons with the Sphero BOLT+ robots.</li> </ul> | Students will be able to: <ul style="list-style-type: none"> <li>• Construct a sequential and organized algorithm (using block code) that successfully dictates the Sphero BOLT+'s movement, lights, and sounds to achieve a specified goal (e.g., navigate a defined path).</li> <li>• Integrate loops (for efficiency) and conditional statements (e.g., If/Then/Else blocks) into a program to allow the robot to make basic decisions based on predefined rules or inputs.</li> </ul> | <ul style="list-style-type: none"> <li>• Use the Sphero EDU website, iPad app, and its resources to complete challenges, lessons, and programming of Sphero BOLT+ robots..</li> </ul> | <ul style="list-style-type: none"> <li>• Observation and questioning</li> <li>• Completion of individual lessons and projects</li> </ul> | ISTE Standards <ul style="list-style-type: none"> <li>• 1.4.c</li> <li>• 1.5.a</li> <li>• 1.5.c</li> <li>• 1.6.b</li> <li>• 1.7.d</li> </ul> STEELS Standards <ul style="list-style-type: none"> <li>• T&amp;E.6.3.8.C.1</li> <li>• T&amp;E.6.3.1 2.E.2</li> </ul> |

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|  |  | <ul style="list-style-type: none"> <li>• Define and utilize variables to store and retrieve data (like speed, color, or a score) to create dynamic and flexible programs.</li> <li>• Break down a complex challenge (e.g., simulating a traffic intersection) into smaller, manageable sub-problems, and create separate functions or blocks of code for each step.</li> <li>• Accurately translate units of time, speed, and distance from code into the physical movement of the Sphero, demonstrating an understanding of how code controls the physical world.</li> <li>• Utilize geometry and measurement skills (specifically angles and distance) to calculate the precise headings and roll times needed for the Sphero to travel between specific points.</li> <li>• Program the Sphero to use its onboard sensors (e.g., the light sensor, accelerometer, or gyroscope) as input to trigger a programmed output (e.g., "If the room light drops, turn the LED Matrix blue").</li> <li>• Manipulate the LED Matrix to display custom patterns, animations, or text to communicate information (e.g., a "STOP" sign or a smiley face) to the user.</li> <li>• Conduct controlled tests of their code, identify errors (bugs) by comparing the intended outcome with the actual outcome, and systematically modify the program to resolve the errors.</li> <li>• Record and explain the iterative process, justifying the changes made to the code or design based on testing results to improve the final product's performance.</li> <li>• Compare different algorithms (their own or a peer's) that achieve the same goal, and evaluate which solution is more efficient, robust, or clean.</li> </ul> |  |  | <ul style="list-style-type: none"> <li>• T&amp;E.6.2.6. A.1</li> </ul> |
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## Unit D: UBTECH Education: UKIT AI Intermediate

**Enduring Question: How can the combination of robotics, programming, and artificial intelligence be utilized to design innovative solutions for complex, real-world challenges?**

**Timeframe:** About 36 classes - 40 minutes each

### Mandatory Resources:

- Desktop Computer and Promethean Board
- Chromebooks
- iPads
- UKIT AI Intermediate Kits
- UKIT Education app
- uCode Website
- Handouts
- Potential Robot Models: Lucky Cat, Musician, Strobe Light, Windshield Wiper, Owl, Scissor Lift, Castle, Mybot, Forklift, Police Car, Trolley, Street Sweeper, Mechanical Arm, Catapult, Boxer

### Academic Vocabulary:

- Artificial Intelligence (AI): The theory and development of computer systems able to perform tasks that normally require human intelligence.
- Machine Learning (ML): A subfield of AI where systems learn from data, identify patterns, and make decisions with minimal human intervention.
- Data: The information collected, stored, and processed by the AI system (e.g., voice input, image pixels, sensor readings) to train models.
- Model: The output of the machine learning process; a program trained on data to predict outcomes or recognize patterns.
- ASR (Automatic Speech Recognition): The technology that allows the robot to recognize and process human speech into text.
- NLP (Natural Language Processing): The subfield of AI that enables the robot to understand, interpret, and generate human language.
- Object Recognition: A computer vision task where a trained model identifies and locates specific objects within an image or video feed.
- Pose Recognition: Identifying the position and orientation of a human body or specific objects in an image.
- Image Segmentation: Dividing a digital image into multiple segments (sets of pixels) to simplify or change the representation of the image into something more meaningful and easier to analyze.
- Neural Network: A foundational concept of deep learning, structured as layers of interconnected nodes (neurons) that process information.
- Chatbot / Large Language Model (LLM): Terms related to systems that use AI to generate human-like text responses and engage in conversation.
- Algorithm: A step-by-step procedure or formula for solving a problem, especially one executed by a computer.
- Robotics: The interdisciplinary branch of engineering and science that involves the design, construction, operation, and use of robots.
- Engineering Design Process: The systematic process used to develop solutions to problems (e.g., define, develop, design, build, test, evaluate).
- Mechanism: An assembly of machine parts that transmit forces and motion in a predetermined way (e.g., a lever, a gear train).
- Actuator: A component of a machine that is responsible for moving and controlling a mechanism or system (e.g., a motor).
- Servo Motor: A motor that allows for precise control of angular or linear position, velocity, and acceleration.
- Wheel Mode (Continuous Rotation): A programming mode for the servo motor that allows it to rotate continuously like a standard motor.
- Angle Mode (Positional): A programming mode for the servo motor that allows it to move to and hold a specific angle
- Sensor: A device that detects and responds to some type of input from the physical environment
- Infrared (IR) Sensor: A sensor that measures infrared light to detect the presence or distance of an object.
- Touch Sensor: A type of switch that is activated by physical contact with an object.
- Programming/Coding: The process of writing instructions that a computer or robot can execute.
- Block-Based Coding: A visual approach to programming where students use graphical blocks to represent code commands.
- MicroPython: A lean and efficient implementation of the Python 3 programming language, which is often used as the text-based coding option for the Intermediate kit.
- Text Coding: Writing instructions using a programming language syntax (like MicroPython/Python).
- Conditional Statement (If/Then/Else): Code that performs different actions depending on whether a specified condition is true or false.
- Loop (Iteration): A sequence of instructions that is continually repeated until a certain condition is reached.
- Variable: A storage location paired with an associated symbolic name, which contains some known or unknown quantity or information.
- Input: Data or signals fed into a program (often from a sensor or microphone).
- Output: The information or action produced by the program (e.g., motor movement, speaking, LED light change).
- Debug/Debugging: The process of finding and fixing errors or bugs in a computer program.
- Pose-Record-Play: A feature that allows students to manually move a multi-jointed robot to a position (pose), record the motor angles, and then play back the sequence of movements via code.

| Big Idea                                                                                                                                                     | Content                                                                                                                                                                                                                                                                                                 | Objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Activities/Strategies                                                                                                                                                                           | Assessment                                                                                                                                 | Standards                                                                                                                                                                                                                                                                             |
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| How can the combination of robotics, programming, and artificial intelligence be utilized to design innovative solutions for complex, real-world challenges? | <ul style="list-style-type: none"> <li>Students will work in pairs to complete the building instructions for each robot model.</li> <li>Students will work in pairs to program each completed robot model to perform various tasks and challenges using elements of artificial intelligence.</li> </ul> | <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>define and identify the key components of artificial intelligence, focusing on real-world applications</li> <li>program robots using the built-in artificial intelligence capabilities of the Main Control Box, including Automatic Speech Recognition (ASR) and Natural Language Processing (NLP) for voice control and interaction</li> <li>engage in hands-on activities that cover Machine Learning model building, object recognition, pose recognition, and image segmentation</li> <li>understand foundational ideas behind more complex AI concepts like neural networks, chatbots, and large language models through extension activities</li> <li>construct increasingly complex and interactive robot models following advanced 3D, 360-degree instructions</li> <li>connect and program the use of multiple components, including the Main Control Box (MCB), four servo motors (in both wheel and angle modes), and various sensors (e.g., infrared, touch, RGB LED eyes)</li> <li>program robots to use sensors to perceive and interact with their environment, such as programming an infrared sensor to detect and avoid obstacles</li> <li>Transition from basic block-based coding (in the uKit EDU app) to more sophisticated programming in the uCode environment</li> <li>practice key computational thinking skills, including decomposition, pattern recognition, abstraction, and algorithms, especially in designing code for complex robot behaviors</li> <li>identify and correct logical and syntax errors in their code and physical robot builds to achieve desired outcomes.</li> </ul> | <ul style="list-style-type: none"> <li>Use the UKIT AI Intermediate kits, UKIT Education app, and uCode coding platform to complete the building and programming of multiple robots.</li> </ul> | <ul style="list-style-type: none"> <li>Observation and questioning</li> <li>Completion of individual robots/lessons/assessments</li> </ul> | <p>ISTE Standards</p> <ul style="list-style-type: none"> <li>1.1</li> <li>1.2</li> <li>1.3</li> <li>1.4</li> <li>1.5</li> <li>1.6</li> <li>1.7</li> </ul> <p>STEELS Standards</p> <ul style="list-style-type: none"> <li>TE.6–8.T.A</li> <li>ETS.6–8.E</li> <li>ETS.6–8.CS</li> </ul> |