Robotics

Using robotic technologies is an innovative way to increase student interest. UC Davis has been conducting research with funding from the National Science Foundation and the California Department of Education. They have found that using robotics helps close achievement gaps and engages traditionally unrepresented groups and at-risk students in hands-on learning with computing. Robotics integration also helps students use critical thinking and problem-solving skills to connect math and science to their real world lives.

Uses of robotics:
- Create a high level of engagement in rigorous tasks
- Develop proficiency and fluency with technology
- Build relationships and solve problems collaboratively
- Strengthen independent and critical thought as well as problem solving skills

Computational Thinking:
- Abstraction – An example of abstraction might be choosing the right robot for the task or selecting the correct (*efficient and effective*) code.
- Algorithmic Thinking – Any steps designed while using the robot, whether it be code or behaviors. An example of algorithmic behavior: each movement a robot needs to make in order to execute a task (*complete the goal*).
- Decomposition – Students need to initially break down the tasks into robotic movements that will eventually translate into coded movements for the robot.
- Pattern Recognition – Students identify patterns in the code executed by the robot. Students then use these patterns to build their own code.

Tips for using robotics in the classroom:

- Find a support system of experience with teaching robotics.
- Give yourself permission to learn with your students. It's okay to not know everything, as it motivates students to become more resourceful.
- Start with a skill or concept that's familiar to you.
- Show your administrators how robotics tools are being used to teach engineering design, mathematical computation, technology and computer science integration, as well as technical reading & writing. Invite them to observe robotics as teaching tools and not just toys.

Reference:
Prater, L. (2019) A Look at How Robots Are Helping Students Build 21st Century Skills, Three ways to Introduce Robotics into Your Classroom. *The Learning Counsel.* Retrieved from https://thelearningcounsel.com/article/three-ways-introduce-robotics-your-classroom

Resources:
Comprehensive How to Guide: https://www.dexterindustries.com/get-started-robotics-classroom/

- Ozobot STEM Lessons: https://portal.ozobot.com/lessons
- Sphero Lessons: https://edu.sphero.com/cwists/category
- How to set-up a cublets classroom: https://www.modrobotics.com/2019/02/01/structures-of-a-cubelets-classroom/
- Lessons, units and other for cublets: https://www.modrobotics.com/education/educator-resource-hub/
- Lessons for the Makey Makey: https://cdn.shopify.com/s/files/1/0162/8612/files/lesson-plans.pdf?16481577170705338427
- Educators site to Arduino kits: https://www.arduino.cc/en/main/education
- Teacher resources for Hummingbird kits: https://www.birdbraintechnologies.com/hummingbirdduo/resources/
- Littlebits educators page (lessons are at the very bottom): https://classroom.littlebits.com/welcome