Robotics

Content Area: **Science**
Course(s):
Time Period: **Marking Period 2**
Length: **3 weeks**
Status: **Published**

Course Pacing Guide

Unit	MP/Trimester	Weeks
Robotics	2	3

Unit Overview

In this unit, students will work in a team to design and construct a NXT robot that will follow a white line, turn around when coming up to a wall, and distinguish between a red ball and a blue ball by hitting the red one but not the blue one. Students will learn about design, construction and programming of their robot. Once they have constructed their prototype and completed the first three tasks they will redesign and reprogram their robot. It now needs to be able to stay in a black ring with a white boarder and simultaniously react when another robot is in front of it. Based on their preliminary findings they will then make adjustments to their design and retest. This may occur several times so the students can optimize their design. Each group will then present their design to the client (teacher) to qualify for the final competition where the robots battle eachother, trying to stay in the ring while pushing the other robot out.

Enduring Understandings

Writing a complex program so that the robot has a decision tree, or a hierarchy of if/then statemednts guiding it's movement.

Essential Questions

How can I change the design to give my robot an advantage?

New Jersey Student Learning Standards (No CCS)

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.2.12.C	Design: The design process is a systematic approach to solving problems.

Amistad Integration

The Amistad Bill (A1301), which became law in 2002, calls on New Jersey schools to incorporate African-American history into their social studies curriculum.

This course does not fall in this category.

Holocaust/Genocide Education

a. Every board of education shall include instruction on the Holocaust and genocides **in an appropriate place in the curriculum** of all elementary and secondary school pupils.

This is not the approprate place

Interdisciplinary Connections

CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.B.CS2	Create original works as a means of personal or group expression.

Technology Standards

TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.

21st Century Themes/Careers

List specific standards that are relevant
No general statements

CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Financial Literacy Integration

1. The State Board of Education shall require that a school district incorporate **in each of the grades [1][kindergarten] six[1] through eight** financial literacy instruction to pupils enrolled in those grades. The purpose of the instruction shall be to provide [1][elementary and][1]middle school students with the basic financial literacy necessary for sound financial decision-making.

These students do not fall in this range.

Instructional Strategies & Learning Activities

In this unit, students will work in a team to design and construct a NXT robot that will follow a white line, turn around when coming up to a wall, and distinguish between a red ball and a blue ball by hitting the red one but not the blue one. Students will learn about design, construction and programming of their robot. Once they have constructed their prototype and completed the first three tasks they will redesign and reprogram their robot. It now needs to be able to stay in a black ring with a white boarder and simultaniously react when another robot is in front of it. Based on their preliminary findings they will then make adjustments to their design and retest. This may occur several times so the students can optimize their design. Each group will then present their design to the client (teacher) to qualify for the final competition where the robots battle eachother, trying to stay in the ring while pushing the other robot out.

Differentiated Instruction

- Curriculum Map
- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Tiered Learning Targets
- Learning through play
- Relationship-Building & Team-Building

- Self-Directed Learning
- Debate
- Student Data Inventories
- Mastery Learning (feedback toward goal)
- Goal-Setting & Learning Contracts
- Grouping
- Rubrics
- Flipped Classroom
- Mentoring
- Assessment Design & Backwards Planning

Formative Assessments

Students will be repedatidly testing and retesting their robots and the programing. They will also be able to have unsanctioned matches before the final day to help determine how their robot is performing.

Summative Assessment

On the final day, robots must first qualify to compete by fulfilling the design requirements, then the results of the compitition along with watching how well their design and programing fulfilled the requirements.

Benchmark Assessments

There are no benchmarks for this assignment.

Alternate Assessments

On the final day, robots must first qualify to compete by fulfilling the design requirements, then the results of the compitition along with watching how well their design and programing fulfilled the requirements. This is an alternative to the traditional assessment methods.

Resources & Technology

The LEGO NXT Robotics kit and the LEGO Mindstorm program platform.

BOE Approved Texts

There is no text for this unit

Closure

On the final day, robots must first qualify to compete by fulfilling the design requirements, then the results of the compitition along with watching how well their design and programing fulfilled the requirements. This is an alternative to the traditional assessment methods.

ELL

- Teacher Modeling
- Group work
- Simplified Written and Verbal Instructions
- Google Translate

Special Education

- Specify and list exactly what the student will need to learn to pass.
- Evaluate the classroom structure against the student's needs (flexible structure, firm limits, etc.).
- Keep workspaces clear of unrelated materials.
- Reduce visual distractions in the classroom (mobiles, etc.).
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Allow the student to complete an independent project as an alternative test.
- Grade spelling separately from content.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).

- Stand near the student when giving directions or presenting a lesson.

504

- preferential seating
- extended time on tests and assignments
- modified textbooks or audio-video materials
- behavior management support
- excused lateness, absence, or missed classwork

At Risk

- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Assistance in maintaining uncluttered space
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Cue/model expected behavior
- Use de-escalating strategies
- Use peer supports and mentoring
- Chart progress and maintain data

Gifted and Talented

Focus on effort and practice

Offer the Most Difficult First

Offer choice

Speak to Student Interests

Allow G/T students to work together

Encourage risk taking