Middle-level CTE Learning Experience Title: Robot Winter Olympics Educator: Tonya Lackey, Westport Central School District Length of Lesson: 11 days (40 minute periods) Grade Level: 7-8	CTE Area: Technology and Engineering Education CTE Theme: Communication and Interpersonal Relationships CTE Content: Abilities for a Technological World Date Created: September 10, 2019

PLANNING	
Curriculum Goal	Students write a computer program for a given task, such as navigating a robot through a maze or slalom course. In groups, students develop a basic algorithm or program design to plan a program that includes a sequence of events and decision making. Students write the prototype code to complete the task based on their plan and document the program components. Students test and optimize the program. Develop a basic website that advertises a new product or technological innovation. Include pictures and text that identify the features of the product or innovation. Create links to different pages on the website and to outside links where the user can learn more.
Essential Question(s)	What communication and interpersonal skills can enhance an individual's ability to develop caring,respectful, effective relationships within the home, school, community, and workplace? What do students need to understand to be able to use, manage, assess, and create technologicallyproducts and systems in a rapidly changing technological world?

National Standards	Common Career Technical Core Standards
	www.careertech.org/career-ready-practices
	Career Ready Practices
	      1. Act as a responsible and contributing citizen and employee
	      2. Apply appropriate, academic, and technical skills
	      4. Communicate clearly and effectively and with reason
	      6. Demonstrate creativity and innovation
	      8.Utilize critical thinking to make sense of problems and persevere in solving them
	      9. Model integrity, ethical leadership, and effective management
	      11. Use technology to enhance productivity
	      12. Work productively in teams while using cultural global competence
	
	International Technology and Engineering Education Association
	Standards for Technological Literacy
	http://www.iteea.org/39197.aspx
	Abilities for a Technological World
	      11. Students will develop abilities to apply the design process.
	      12. Students will develop abilities to use and maintain technological products and systems.
	      13. Students will develop abilities to assess the impact of products and systems.

NYS Standards	New York State Career Development and Occupational Studies (CDOS) Standards
	http://www.p12.nysed.gov/cte/
	       Standard 1: Career Development
	           Students will be knowledgeable about the world of work, explore career options, and relate personal skills, aptitudes, and abilities to future career decisions.
	       Standard 2: Integrated Learning
	           Students will demonstrate how academic knowledge and skills are applied in the workplace and other settings.
	       Standard 3a: Universal Foundation Skills
	           Students will demonstrate mastery of the foundation skills and competencies essential for success in the workplace.

Learning Objectives	Communication and Interpersonal Relationships
	3. Workplace Communication
	    Students will
	       b) Describe ways effective communication promotes workplace efficiency
	       c) Examine a variety of types of reports required of workers in a variety of careers
	       d) Describe the role of observation in the development of work reports
	       e) Explain how to give and receive accurate reports in a variety of formats
	       f) Demonstrate effective communication skills in a group setting to accomplish a task
	4. Relationships
	    Students will
	       a) Define the term "relationship"
	       b) Analyze the functions and expectations of various types of relationships and how they may change over time
	       c) Examine processes for building and maintaining relationships
	       d) Explain the impact of personal standards and codes of conduct on relationships
	       e) Demonstrate and practice behaviors that promote healthy relationships through a variety of classroom applications
	5. Peer Relationships
	    Students will
	       e) Explain how individuals can assert personal choices within a peer group structure
	       f) Identify and practice ways the individual can have a positive impact on peers through a variety of classroom applications
	6. Conflict Prevention and Management
	    Students will
	       a) Assess personal strengths and weaknesses and ways they influence relationships
	       f) Contribute to a classroom environment that encourages respect for the ideas, perspectives, and contributions of all
	7. Careers in the Communication and Human Services Field
	    Students will

	a) Investigate knowledge, skills, and practices needed for a career in the communications and human services fields
	
	Abilities for a Technological World
	2. Use and Maintain Technological Products and Systems
	    Students will
	        a) Use information resources, manuals, documents, or experienced people to describe how systems work
	        c) Utilize computer and information resources to operate and maintain a system
	3. Assess the Impact of Products and Systems
	    Students will
	        a) Utilize instruments to measure and gather data
	        b) Identify trends or patterns in data to be applied toward decision making and identify positive and negative effects of technologies
	        c) Interpret and evaluate accuracy of information to determine the quality of products and systems	

Vocabulary	Academic Presentation, Design Group, Communication, Design Thinking, Engineering Design Cycle, Redesign, Testing	Content Computer Programmer, Program, Code, Algorithm, Pseudocode, Efficiency, Robot, Comments, Inputs, Outputs, Commands, Sequence, Electric Motor, Rotational Sensor, Accuracy, Speed, Computer, Sensors
Materials and Resources	Age appropriate educational robotics system and compatible programming device (Day 1 - 11) Materials for Olympic sport events: Curling target, Bobsled track, Biathlon target including plastic cups, popsicle sticks, construction paper (Day 1 - 11) Devices with Internet access for research Videos of Olympic Games (Do Now) https://www.olympic.org/videos/pyeongchang-2018 Olympic Games research site (Day 2) https://www.olympic.org	

INSTRUCTION	What will the teacher do?	What will the students do?	How much time for each activity?
Pre-assessment	Day 1 Present the following survey the students 1) Describe in one sentence what 'robot' means to you. 2) What are the three main parts of a robot? 3) What do people do to make a robot move? 4) What do we call someone	Day 1 Students respond to pre-assessment survey questions.	10 minutes

	who writes code to control a robot?		
Do-now/Hook	Day 1 (cont.) Show clips from the Winter Olympics of curling, slalom, biathlon, and bobsled.https://www.olympic.org/videos/pyeongchang-2018Discuss Olympic athlete preparation practices. Describe what a computer programmer does.	Day 1 (cont.) Students watch the videos taking notes as to what each event is and how to complete the task. Take notes of what an Olympic athlete needs to do to train/prepare for competition. Take notes to what a Computer Programmer does.	30 minutes
Procedure for Instruction/ Learning Activities	Day 2 Introduce project to plan and code a robot to compete in four Olympic sports: curling, slalom, biathlon, and bobsled. Explain the Engineering Design Process: State the Problem, Research and Generate Ideas/Develop a Plan, Select the BEST Solution/Plan, Program the Code and Build the Robot, Test and Evaluate Results, Final Competition/Present Results.	Day 2 Students attend to teacher presentation of the project; ask questions.	40min 15 minutes
	Create groups of 2-3 students. Have students within each group determine who is going to coach which sport and who is going to be the athlete for each sport. The coach writes the code, the athlete will manage the robot.	Students introduce themselves to group members. Decide which group member is going to be the coach and athlete for each sport. Ask questions as needed.	25 minutes
	Day 3 Review project and present today's goal: to generate a list of questions that guide us in our research to gather information we need to complete the Olympic event (i.e.	Day 3 Students attend to review.	40min 5 minutes

	description of event and rules)		
	Lead class discussion to create a list of questions to be researched. (i.e. What information do we need to know in order to program our robots to complete the sporting event of our choice?)	Brainstorm with the teacher to create a list of questions about the sport, which you answer by researching.	10 minutes
	Guide students to appropriate websites for research: https://www.olympic.org	Choose one student to be the note taker for the group. That student creates a Google doc and shares with other group members. List the questions to be answered about the sport. Everyone researches the answers to the questions, citing all websites used in MLA format. Summarize the information found for each event chosen.	25 minutes
	Day 4 Review project and discuss key terms: programmer, algorithm, sequence, pseudocode	Day 4 Students attend to review.	40min 10minutes
	Present the day's goal: Generate at least three Ideas/Plans in pseudocode to complete the Olympic event of choice.	Generate three different ways you can program your robot to complete the sporting event of your choice using pseudocode.	25 minutes
	Explain what pseudocode means.	Exit ticket-Write what pseudocode means in your own words.	5min
	Day 5-7 Review project and vocabulary, discuss key terms: efficiency, accuracy, speed, electric motor, rotational sensor, accuracy, computer, sensors.	Day 5-7 Students attend to review.	40 min x 3 days 5-10 minutes each day
	Present the goal: Choose the BEST	Student groups choose the BES Idea/Plan	20-30 minutes

	Idea/Plan of the three your group created last class.	
	Give students suggestions and options on how to build the robot, adding motors and sensors to build a contraption for the robot to compete in the Olympic game. Help students write an algorithm for their Olympic sport and then transfer it to the programming language. Help each group stay on task and make appropriate progress toward the end goal.	Students work in groups to build and write a program for the robot to compete in Olympic game of their choice. The student athletes will use sensors and motors to build the robot and any additional contraptions needed. The student coaches will write the code for the robot to compete in the Olympic game.	30min each day

	Day 8-9
	Present the goal: Test and refine your program and robot on course:
	    Just as an Olympic athlete would practice.
	    Just as an engineer builds a prototype and tests in order to tweak a design to make it better.
	Help each group stay on task and make appropriate progress toward the end goal.
		Day 8-9
		Student groups test their programs and robots on the Olympic course.
		    Make notes in your Google Document of what is working well and what is not working well.
		    Tweak the program and/or re-build the robot to create the most efficient and accurate robot possible.
			40min x 2 days

	Day 10-11 Competition Day Prior to class set-up an area for each Olympic Event. Invite the school to be the audience. Organize a time, if possible, to have all the students compete at the same time. If possible gather other adults to act as event judges. Congratulate the students for	Day 10-11 Groups compete in each event for which their group prepared and record results. Note what went wrong and what went right.	40min x 2 days 40-80 minutes (if done as a whole school assembly)

	making it to competition day. Review the rules of each Olympic game. Have students complete in their game. **Day 12** Reflect, Assess, Disassemble Robot and clean up.	**Day 12** Write a short 3-4 paragraph essay answering the following questions: What went well throughout the process. What did not go well throughout the process. What would you change about your robot/program next time. List three things you learned. List one thing you wish to learn more about. List one thing you would do differently next time. Disassemble your robot and organize its supplies.	40min
Differentiation	Students will be grouped by their abilities and interests. Teacher will provide scaffolded support where needed. Students who have physical disabilities will be accommodated for. Students who are meeting all of the expectations will be challenged to go above and beyond.	
Closure	**Day 12** Write a short 3-4 paragraph essay answering the following questions: What went well throughout the process. What did not go well throughout the process. What would you change about your robot/program next time. List three things you learned. List one thing you wish to learn more about. List one thing you would do differently next time.	
ASSESSMENT		
College, Career, and Life Readiness Skills	See below Based on Middle-level Life/Career Rubrics available at https://nyctecenter.org/middle-level-life-career-rubric-database/rubrics	

Performance Measure	Exemplary	Proficient	Developing	Beginning
Acts Responsibly in the Interests of Others	Contributes extensively to a community organization or event; thoughtfully reflects on the importance of own actions within the community.	Contributes to a community organization or event and reflects on the importance of personal involvement within the community.	Participates in, but does not contribute to, a community organization or event and attempts to reflect on personal involvement within the community.	Does not contribute to a community organization or event or reflect on the importance of involvement within the community.
Listens and Cooperates With Team Members	Consistently listens to others and their ideas; helps the team reach its full potential.	Listens to others points of view and makes a definite effort to understand their ideas.	Sometimes listens to others, but often assumes other ideas will not work. Tries to work well with the team.	Does not listen to group opinions and ideas; wants things done own way.
Listens and Speaks when Appropriate	Engages in conversations/ discussions and consistently understands when it is appropriate to speak and when it is appropriate to listen.	Engages in conversations/ discussions and understands when it is appropriate to speak and when it is appropriate to listen.	At times, speaks when it is not appropriate and does not listen when it is appropriate.	Often needs to be reminded of appropriate times to speak and appropriate times to listen.
Regulates Emotions	Consistently uses self-talk strategies to reduce negative emotions and always adjusts body language and tone of voice to reduce triggering a negative emotional reaction in others.	Uses self-talk strategies to reduce negative emotions and usually adjusts body language and tone of voice to reduce triggering a negative emotional reaction in others.	Sometimes adjusts body language and tone of voice to control emotions.	Fails to control emotions or behaves in a manner that triggers negative emotions in others.
Shares Responsibility	Motivates members to share contributions equally by valuing all members ideas and contributions.	Participates in and contributes to group work. Values all members ideas and contributions.	Attempts to share responsibility of group work, but ends up completing little of the work by disregarding the input of others.	Does very little of the group work; does not share ideas or respect others ideas.
Uses Technology to Locate and Evaluate Information	Effectively and consistently uses multiple technology tools to collect, organize, evaluate, and/or communicate information.	Uses technology effectively as a tool to collect, organize, evaluate, and/or communicate information.	Uses popular technology tools to collect and/or communicate information.	Attempts to use technology to collect and/or communicate information are ineffective.

Writes Clearly	Consistently writes clearly, uses correct grammar, and understands the intended audience of documents that are produced.	Writes clearly, generally using correct grammar, and understands the intended audience of the document produced.	Produces a document that is mostly well written but, sometimes uses incorrect grammar; shows general understanding of the intended audience.	Produces a document that is unclear, uses incorrect grammar, and shows a misunderstanding of the intended audience.
Identifies Emotions	Always accurately labels emotions felt and recognizes behaviors in others that indicate emotions.	Accurately labels own emotions and often recognizes behaviors in others that indicate emotions.	Usually labels emotions felt, but fails to recognize behaviors in others that indicate emotions.	Is unable to identify emotions.
Practices Workplace Safety	Consistently selects and safely uses technological resources (e.g., equipment, machines, tools, electronics) to accomplish work efficiently and productively.	Selects and safely uses technological resources (e.g., equipment, machines, tools, electronics) to accomplish work productively.	Requires reminders to select and safely use technological resources (e.g., equipment, machines, tools, electronics) to accomplish work.	Often disregards safety standards and instructor and manufacturer guidelines.
Shows Empathy	Consistently puts aside personal viewpoint, always considers the other person's point of view.	Is able to put aside personal viewpoint, Regularly sees things from the other person's point of view.	Tries to see things from the other person's point of view.	Shows little interest in other people's needs or perspectives.
Analyzes Critical Information	Thoroughly evaluates the reliability of the source and the information researched using internal and external validation.	Thoroughly evaluates information researched using internal and external validation.	Evaluates information researched but not thoroughly.	Does not evaluate information.
Demonstrates Originality and Inventiveness	Consistently demonstrates creativity in new situations.	Demonstrates creativity in many new situations.	Demonstrates creativity but does not always understand how to express it.	Does not demonstrate creativity.
Resolves Problems that Arise in Completing Tasks	Easily and quickly identifies resources that may help solve a specific problem and applies critical thinking to using those resources effectively.	Identifies resources that may help solve a specific problem and applies critical thinking to using that resources correctly.	Sometimes identifies resources that may help solve a specific problem but does not apply critical thinking to using that resources.	Neither identifies resources that may help solve a specific problem nor applies critical thinking to aid in problem-solving.

Shows Willingness to Take Risks	Embraces the idea that attempting/experimenting is an important part of success and approaches opportunities with an understanding that failed attempts are likely.	Understands that attempting/experimenting is an important step on the path to success, including failed attempts.	Understands that attempting/experimenting is an important step on the path to success but does not understand that this includes failed attempts as well.	Does not understand how failed attempts are part of the process that leads to success.
Uses System Thinking	Recognizes and manipulates parts of a system to come together to accomplish tasks.	Recognizes how the parts of a system work together to accomplish tasks.	Identify the parts of a system but cannot explain how they work together.	Is able to identify only some system parts and loses sight of how they work together.