ROBBINSVILLE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

DEPARTMENT
Sharon School STEAM

COURSE TITLE
STEAM Addendum Grade 4

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BOARD OF EDUCATION INITIAL ADOPTION DATE:

Integration of 21st Century Themes and Skills

Educational Technology
Standards:
• **Technology Operations and Concepts:** 8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures. • **Example**: After students complete a STEAM challenge, an online portfolio can be used to record data and findings. Graphs, symbols and pictures can be used to represent their learning and how they can improve their challenge outcome in the future. For example, During the marshmallow challenge, students can take a picture of their tower and add it to their portfolio. When students then do the earthquake/building unit, they can refer back to their marshmallow picture and use what worked/didn't work to construct their toothpick/clay tower (using triangles, cross support beams, etc.) • **Technology Operations and Concepts:** 8.1.5.A.5 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data. • **Example**: Students can record results of STEAM experiments/challenges and using Google Sheets create a graph and/or chart to demonstrate their findings/results. For example, during our catapult unit, teams construct various types of catapults and launch various sized pom-poms (load) and record their findings in Google sheets. They then create a graph with their data and discuss trends and decide which catapult and load is the most efficient.

Career Ready Practices

Standards: CRP2, CRP6

CRP2- Students have the opportunity to apply specific mathematical and scientific principles in order to develop solutions to various engineering challenges. Student creativity and risk taking are emphasized in a design and problem solving format that allows them to engage their original solutions in an encouraging environment. With new design innovations, students will recognize the importance of being mindful of the resources and process used to produce them to have a more positive impact on the environment. Implementing meaningful hands-on problem solving activities for students will prepare them for using these skills in a workplace situation.

Example: Many STEAM challenges reflect on problems or issues in the world today. During STEAM challenges students research, evaluate and understand how what they are learning relates to the real world. For example, during our bridge unit, students research why certain bridges are used for different types of soil/terrain and why this is important.

CRP6- Students will be challenged to participate as members of STEAM groups to complete multiple challenges throughout the year. Independent and group work will be reflective of authentic projects found in the design world. Student performance will be assessed in numerous and diverse ways. Measurement of student performance will be reflective of evaluative processes. Students can consider unconventional ideas and suggestions as solutions to their STEAM challenges and discern which ideas and suggestions will add greatest value. They will seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own challenge.

Example: Students will demonstrate the responsibilities associated with being a member of a team when engaging collaboratively during STEAM challleges. Students wiil be encouraged to think "outside the box" and come up with multiple ways to solve a problem. Students will give examples as to why they chose a certain way of completing their challenge and why they chose not to use others. For example, during our catapult unit students are given a variety of materials to use to construct their catapult. They are also given different size pom-poms (the load) to use. By constructing mutiple catapults and experimenting with multiple loads they will discover which works best. A challenge as simple as constructing the strongest bridge using just one piece of paper can spark creativity and innovation.

Robbinsville Ready 21st Century Skill Integration

The following skills will be embedded throughout the curriculum and instruction of this course.

Collaborative Team Member: Robbinsville students will learn more by working together than in isolation. As educational theorist Lev Vygotsky advocated, learning is a social process. Many workplaces today encourage employees to work in teams to solicit diverse perspectives, brainstorm new ideas and/or products, and solve problems. Further, collaboration fosters interpersonal relationships, self-management skills, cooperation, and a sense of collective responsibility. Collaborative team members are able to work with diverse groups of people who hold a variety of perspectives.

Effective Communicator: Robbinsville students must be able to clearly articulate their ideas orally, in writing, and across various media in order to successfully connect to the world around them. As the world becomes increasingly globalized, communication is more than just sharing one's ideas. Effective communicators are able to communicate their convictions, actively listen and analyze others' work to identify perspective and/or potential bias.

Emotionally Intelligent Learner: Robbinsville students who are emotionally intelligent learn to be empathetic, demonstrate integrity and ethical behavior, are kind, are self-aware, willing to change, and practice self-care. They are better able to cope with the demands of the 21st century digital society and workplace because they are reliable, responsible, form stable and healthy relationships, and seek to grow personally and professionally. Emotionally intelligent people are able to manage their emotions, work effectively on teams and are leaders who can grow and help to develop others.

Informed and Involved Citizen: Robbinsville students need to be digital citizens who are civically and globally aware. The concept of what it means to be "literate" has evolved along with 21st century technological and cultural shifts. Our progressive vision of literacy entails having our students explore real world problems in the classroom. Informed and involved citizens are able to safely and accurately communicate with people all around the world and are financially, environmentally and informationally literate.

Innovative Thinker: Robbinsville students must encompass innovative thinking skills in order be successful lifelong learners in the 21st century world. As stated by Karl Fisch and Scott McLeod in the short film Shift Happens, "We are currently preparing students for jobs that don't yet exist . . . using technologies that haven't been invented . . . in order to solve problems we don't even know are problems yet." Innovative thinkers are able to think analytically, solve problems critically, creatively engage in curiosity and tinkering, and demonstrate originality.

Resilient and Self-Directed Learner: Robbinsville students need to take risks and ultimately make independent and informed decisions in an ever-changing world. Author of Life, the Truth, and Being Free, Steve Maraboli stated, "Life doesn't get easier or more forgiving, we get stronger and more resilient." Self-directed scholars of the 21st century are able to set goals, initiate resolutions by seeking creative approaches, and adjust their thinking in light of difficult situations. Resilient students are able to take risks without fear of failure and overcome setbacks by utilizing experiences to confront new challenges. Resilient and self directed scholars will consistently embrace opportunities to initiate solutions and overcome obstacles.

Interdisciplinary Connections

4-PS3-1 Energy

Use evidence to construct an explanation relating the speed of an object to the energy of that object. (Speedometry Unit)- See below.

4-PS3-3 Energy

Ask questions and predict outcomes about the changes in energy that occur when objects collide. (Speedometry Unit)- See below.

Hot Wheels Speedometry encourages inquiry and real-world, problem-based learning through play, hands-on activities and in-depth lesson plans that is mapped to state and national standards including Common Core State Standards (CCSS), Next Generation Science Standards (NGSS). These lessons and student activities are designed using the 5E Model (Engage, Explore, Explain, Elaborate and Evaluate) to support students in asking questions and creating experiments to determine the answers. Over the course of the lessons, students will work in collaborative learning groups to deepen their understanding of potential and kinetic energy by observing, predicting, measuring and exploring the effect that the height of a ramp has on the transfer of energy to Hot Wheels cars. The same 5E Model is the basis for the lessons in this unit with the purpose of inspiring students to explore further. Google Sheets will be used to document and track data and to locate patterns and trends.

General Differentiated Instruction Strategies

- Leveled texts
- Chunking texts
- Choice board
- Socratic Seminar
- Tiered Instruction
- Small group instruction
- Guided Reading
- Sentence starters/frames
- Writing scaffolds
- Tangible items/pictures
- Adjust length of assignment
- Repeat, reword directions
- Brain breaks and movement breaks
- Brief and concrete directions
- Checklists for tasks
- Graphic organizers
- Assistive technology (spell check, voice to type)
- Study guides
- Tiered learning stations
- Tiered questioning
- Data-driven student partnerships
- Extra time

Possible Additional Strategies for Special Education Students, At-Risk Students, and English Language Learners (ELLs)

Time/General	Processing	Comprehension	Recall
• Extra time for assigned tasks • Adjust length of assignment • Timeline with due dates for reports and projects • Communication system between home and school • Provide lecture notes/outline	• Extra Response time • Have students verbalize steps • Repeat, clarify or reword directions • Mini-breaks between tasks • Provide a warning for transitions • Reading partners	• Precise step-by-step directions • Short manageable tasks • Brief and concrete directions • Provide immediate feedback • Small group instruction • Emphasize multi-sensory learning	• Teacher-made checklist • Use visual graphic organizers • Reference resources to promote independence • Visual and verbal reminders • Graphic organizers
Assistive Technology	**Assessments and Grading**	**Behavior/Attention**	**Organization**
• Computer/whiteboard • Tape recorder • Spell-checker • Audio-taped books	• Extended time • Study guides • Shortened tests • Read directions aloud	• Consistent daily structured routine • Simple and clear classroom rules • Frequent feedback	• Individual daily planner • Display a written agenda • Note-taking assistance • Color code materials

Enrichment

The goal of Enrichment is to provide learners with the opportunity to participate in extension activities that are differentiated and enhance the curriculum. All enrichment decisions will be based upon individual student needs.

- Show a high degree of intellectual, creative and/or artistic ability and demonstrate this ability in multiple ways.
- Pose questions and exhibit sincere curiosity about principles and how things work.
- The ability to grasp concepts and make real world and cross-curricular connections.
- Generate theories and hypotheses and pursue methods of inquiry.
- Produce products that express insight, creativity, and excellence.
- Possess exceptional leadership skills.
- Evaluate vocabulary
- Elevate Text Complexity
- Inquiry based assignments and projects
- Independent student options

- Tiered/Multi-level activities
- Purposeful Learning Center
- Open-ended activities and projects
- Form and build on learning communities
- Providing pupils with experiences outside the 'regular' curriculum
- Altering the pace the student uses to cover regular curriculum in order to explore topics of interest in greater depth/breadth within their own grade level
- A higher quality of work than the norm for the given age group.
- The promotion of a higher level of thinking and making connections.
- The inclusion of additional subject areas and/or activities (cross-curricular).
- Using supplementary materials in addition to the normal range of resources.

English Language Learner (ELL) Resources

- Learning style quiz for students- http://www.educationplanner.org/students/self-assessments/learning-styles-quiz.shtml
- "Word clouds" from text that you provide-http://www.wordle.net/
- Bilingual website for students, parents and educators: http://www.colorincolorado.org/
- Learn a language for FREE-www.Duolingo.com
- Time on task for students-http://www.online-stopwatch.com/
- Differentiation activities for students based on their Lexile-www.Mobymax.com
- WIDA-http://www.wida.us/
- Everything ESL - http://www.everythingESL.net
- ELL Tool Box Suggestion Sitehttp://www.wallwisher.com/wall/elltoolbox
- Hope4Education - http://www.hope4education.com
- Learning the Language http://blogs.edweek.org/edweek/learning-the-language/
- FLENJ (Foreign Language Educators of NJ) 'E-Verse' wiki: http://www.flenj.org/Publications/?page=135
- OELA - http://www.ed.gov/offices/OBEMLA
- New Jersey Department of Education- Bilingual Education information http://www.state.nj.us/education/bilingual/

Special Education Resources

- Animoto -Animoto provides tools for making videos by using animation to pull together a series of images and combining with audio. Animoto videos or presentations are easy to publish and share. https://animoto.com
- Bookbuilder -Use this site to create, share, publish, and read digital books that engage and support diverse learners according to their

individual needs, interests, and skills. http://bookbuilder.cast.org/

- CAST -CAST is a non-profit research and development organization dedicated to Universal Design for Learning (UDL). UDL research demonstrates that the challenge of diversity can and must be met by making curriculum flexible and responsive to learner differences. http://www.cast.org
- CoSketch -CoSketch is a multi-user online whiteboard designed to give you the ability to quickly visualize and share your ideas as images. http://www.cosketch.com/
- Crayon -The Crayon.net site offers an electronic template for students to create their own newspapers. The site allows you to bring multiple sources together, thus creating an individualized and customized newspaper. http://crayon.net/ Education Oasis -Education Oasis offers a collection of graphic organizers to help students organize and retain knowledge – cause and effect, character and story, compare and contrast, and more! http://www.educationoasis.com/printables/graphic-organizers/
- Edutopia -A comprehensive website and online community that increases knowledge, sharing, and adoption of what works in K-12 education. We emphasize core strategies: project-based learning, comprehensive assessment, integrated studies, social and emotional learning, educational leadership and teacher development, and technology integration. http://www.edutopia.org/
- Glogster -Glogster allows you to create "interactive posters" to communicate ideas. Students can embedded media links, sound, and video, and then share their posters with friends. http://edu.glogster.com/?ref=personal
- Interactives – Elements of a Story -This interactive breaks down the important elements of a story. Students go through the series of steps for constructing a story including: Setting, Characters, Sequence, Exposition, Conflict, Climax, and Resolution. http://www.learner.org/interactives/story/index.html
- National Writing Project (NWP) -Unique in breadth and scale, the NWP is a network of sites anchored at colleges and universities and serving teachers across disciplines and at all levels, early childhood through university. We provide professional development, develop resources, generate research, and act on knowledge to improve the teaching of writing and learning in schools and communities. http://www.nwp.org
- Pacecar -Vocab Ahead offers videos that give an active demonstration of vocabulary with audio repeating the pronunciation, definition, various uses, and synonyms. Students can also go through flash cards which give a written definition and visual representation of the word. http://pacecar.missingmethod.com/