Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

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Curriculum Development Timeline

School: Township of Ocean Intermediate School

Course: Science, Grade 6

Department: Science

Board Approval	Supervisor	Notes
February 2009	Patrick Sullivan	Born Date
June 2011	Patrick Sullivan	Revisions
August 2017	Patrick Sullivan	Revisions
March 2019	Patrick Sullivan	Review

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Pacing Guide			
Week	Marking Period 1	**Week**	Marking Period 3
1	Science Lab Safety/Scientific Practices	21	Using Engineering Skills to Solve Real World Problems
2	Current Events/ Science Writing Skills	22	Using Engineering Skills to Solve Real World Problems
3	Earth Science: Human Impact	23	Using Engineering Skills to Solve Real World Problems
4	Earth Science: Human Impact	24	Using Engineering Skills to Solve Real World Problems
5	Earth Science: Earth's Systems	25	Using Engineering Skills to Solve Real World Problems
6	Earth Science: Earth's Systems/ Earth and Human Activity	26	Using Engineering Skills to Solve Real World Problems
7	Earth Science: Earth's Systems	27	Physical Science: Matter & Its Interactions/ Scientific Practices
8	Earth Science: Earth's Systems	28	Physical Science: Matter & Its Interactions/ Scientific Practices
9	Earth Science: Earth's Systems	29	Physical Science: Matter & Its Interactions/ Scientific Practices
10	Earth Science: Earth's Systems	30	Physical Science: Matter & Its Interactions/ Scientific Practices
Week	Marking Period 2	**Week**	Marking Period 4
11	Earth Science: Earth and Human Activity/ Engineering Design	31	Physical Science: Matter & Its Interactions/ Scientific Practices
12	Earth Science: Earth and Human Activity	32	Physical Science: Matter & Its Interactions/ Scientific Practices
13	Earth Science: Earth and Human Activity/Engineering Design	33	Physical Science: Matter & Its Interactions/ Scientific Practices
14	Earth Science: Earth and	34	Earth Science: Earth's Place in the Universe

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	Human Activity		
15	Earth Science: Earth and Human Activity	35	Earth Science: Earth's Place in the Universe
16	Earth Science: Earth and Human Activity/ Engineering Design	36	Earth Science: Earth's Place in the Universe
17	Earth Science: Earth's Systems	37	Earth Science: Earth's Place in the Universe
18	Earth Science: Earth's Systems	38	Earth Science: Earth's Place in the Universe
19	Earth Science: Earth's Systems	39	Earth Science: Earth's Place in the Universe
20	Earth Science: Earth's Systems	40	Year End Review Google Slide Presentation

Core Instructional & Supplemental Materials including various levels of Texts

Texts:
Holt/Science + Technology Series: Holt, Reinhart, Winston
Inside the Restless Earth
Water on Earth
Introduction to Matter
Digital Resources Across All Levels: (D=differentiated)
STEMScopes (D)
Freckle
Edpuzzle (D)
Science World Articles
YouTube Streaming Videos
PhET Interactive Simulations (D)
ScienceSpot

Time Frame	**10 Weeks**

Topic

- Science Practices / Engineering Design Process
- Understanding Scientific Explanation
- Evidence through Active Investigations
- Earth Systems

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Essential Questions

- How do we safely gather information to describe and explain the natural and designed world?
- Why is cooperation and sharing of information critical to science?
- How is scientific knowledge constructed?
- What are the needs of all living things?
- What makes water essential to life on Earth?
- How does water move on Earth?
- How do humans access as well as impact the water on Earth?
- What is the difference between weather and climate?
- What causes seasons?
- How does the ocean affect the climate?
- What are tides?
- How does the movement of the moon create tides and moon phases?

Enduring Understandings

- Observations are used to categorize, represent and interpret the natural world.
- Evidence is gathered for building, refining, and/or critiquing scientific explanations.
- Scientific knowledge builds upon itself over time and changes to fit new evidence.
- In the United States, we use both standard and metric systems of measurements. Metric measurements are used to communicate with scientists worldwide.
- Lab safety should always be used in pursuit of observation.
- Water continually cycles among land, ocean and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land.
- Global movements of water and its changes in form are propelled by sunlight and gravity.
- The complex patterns of change and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns.
- Because these patterns are so complex, weather can only be predicted probabilistically.

- Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.
- Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect the oceanic and atmospheric flow patterns.
- The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally distributing it through ocean currents.
- The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.
- The tilt of the Earth and its revolution around the sun causes seasons,
- The revolution of the moon causes the tides and moon phases

Alignment to Standards

MS-ESS2-4
MS-ETS1

Key Concepts and Skills

- Results of observation and measurement can be used to build conceptual based models and to search for core explanations.
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- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- Analyze data from tests to determine similarities and differences among several design

solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

- Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved

Learning Activities

- Lab Safety Rules and Quiz
- Cooperative learning Tangrams puzzle
- Save Fred Lab update to include Google Drawing/Google Doc
- Current events summarizing
- Compound Microscope diagram/function/quiz
- Compound microscope used to see prepared slides of amoeba and protista, plant part.
- Outdoor Observation and Explanation: Fall brochure
- Bacteria Swabbing Lab
- Water's Diary
- Watershed Lab
- Analyzing point vs nonpoint source pollution maps
- Salty versus. Fresh Lab
- Cold vs. Warm Currents Lab
- Effects of Acid Rain on Sculptures Lab
- Density Tank Salt water vs Fresh Lab
- Cloud Model Demonstration
- Weather Map Activity
- Hurricane Plotting Lab
- Severe Storm Comic Strip Activity
- Engineer a Barge STEM activity
- Modeling sun-earth-moon movements pantomime
- 3-D model movement of moon phases
- Mapping Discovery Activity of tides
- STEMScopes
- Seasons/Moon Phases/Space brochure

Assessments

<u>Formative:</u>
Formative assessments-Exit slip-What are examples of point and nonpoint source pollutants?
STEMScopes: Journey through the water cycle activity and journal entry
STEMScopes: Impact of currents on climate
Discussion of the different types of storms students have experienced.
<u>Summative:</u>

Chapter test: Severe storms
Chapter quiz: Moon phases and eclipses
Benchmark: Using lab tools for measuring/calculating density (skills)
Alternative:
Hurricane Project
Defined Stem engineering activity: Ferries
Astronomy pick a project

Career Education

CRP1. Act as a responsible and contributing citizen and employee.
CRP4. Communicate clearly and effectively and with reason.
CRP12. Work productively in teams while using cultural global competence.

21st Century Skills

Determine the sources of water pollution in a community/Propose Solutions to curtail NPS pollution.
9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.
9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.
9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.

Interdisciplinary Connections

ELA:
Open-Ended Real World Application Questions, Writing Predictions Activity, Lab Report
Cross-curricular novel "The Boy Who Harnessed the Wind" by Bryan Mealer and William Kamkwamba
RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
Mathematics:
Metric measurement, graphing results-Statistics+Probability-6SP
Social Studies:
Latitude/longitude, map reading, plotting ocean currents
Latitude/Longitude , hemispheres- reasons for the seasons
6.1.8.B.1.b- Analyze the world in spatial terms (e.g., longitude, latitude)

Technology Integration

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STEMScopes program (Water Cycle)
TECH.8.1.8.C: Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
TECH.8.1.8.A- Demonstrate knowledge of a real world problem using digital tools

Time Frame	**10 Weeks**

Topic

Earth Science: Earth and Human Activity/Earth Systems

Essential Questions

- What resources do humans use from the Earth?
- Which type of energy sources are better: renewable or nonrenewable?
- How do the use of renewable resources affect the Earth/humans long term?
- How do windmills work?
- What are natural disasters and where do they occur?
- How do humans prepare for natural disasters?

Enduring Understanding

- Humans depend on Earth's land, ocean, atmosphere and biosphere for many different resources.
  - Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes.
  - Resources are distributed unevenly around the world as a result of past geologic processes

Alignment to Standards

MS-ESS3-1 MS-ESS2-1
MS-ETS1

Key Concepts and Skills

- Results of observation and measurement can be used to build conceptual based models and to search for core explanations.
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- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
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Learning Activities

- Energy Research and Infographic Poster Project
- Windmill Engineering STEM activity
- Natural Disaster map tracking/analysis
- Nearpod Research Project: Weather related
- Plot earthquakes/volcanoes to discover Ring of Fire
- Analyze techniques engineers use to mitigate natural disasters
- Retrofitting existing structures research
- Energy Friendly Treehouse/ Tiny House Project
- Design, build and test earthquake resistant structures STEM activity
- Design, build and test a hurricane proof structure (wind/water affect)
- “Life of a Rock” rock cycle stations activity
- Using Earth Materials: Rock Project

Assessments

Formative:
Formative assessment-check out slip-what causes earthquakes?
Discussion-Alternative energy sources pros and cons of each

Summative:
Chapter quiz: Rock cycle
Chapter test: Earthquakes and volcanoes
Benchmark:
Alternative:
Build and test a solar cooker (heater)
Defined Stem Mt. St. Helens project
Alternative energy presentation

Career Education

CRP1. Act as a responsible and contributing citizen and employee.
CRP4. Communicate clearly and effectively and with reason.
CRP12. Work productively in teams while using cultural global competence

21st Century Skills

Design and construct earthquake resistant structures.
9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.
9.3.ST-SM.3 Analyze the impact that science and mathematics has on society

Interdisciplinary Connections

Social Studies:
map reading/plotting data
6.1.8.B.1.b- Analyze the world in spatial terms (e.g., longitude, latitude)
Mathematics:
Interpreting measurement data- Statistics+Probability-6SP
ELA:
Cross-curricular novel "The Boy Who Harnessed the Wind" by Bryan Mealer and William Kamkwamba
RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text

Technology Integration

STEM Scopes program (Earthquakes)
TECH.8.1.8.A- Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.C: Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and

communicate knowledge	
Time Frame	**6 Weeks**

Topic

Engineering to Solve Real World Problems

Essential Questions

- What is technology?
- Who is an engineer?
- How much mass (pennies) can a tiny foil boat hold?
- How can a rubber band powered car be designed to travel a distance of 10 meters?
- How do the criteria and constraints of a design problem affect the possible solutions?
- How can a design model be modified to ensure a successful solution?
- What scientific principles will have an effect on the distance the car will move?

Enduring Understandings

- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful.
- A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.
- Models of all kinds are important for testing solutions.
- Parts of different solutions can be combined to create a solution that is better than any of its predecessors

Alignment to Standards

MS-ETS1-1
MS-ETS1-3
MS-ETS1-2
MS-ETS1-4

Key Concepts and Skills

- Use technology to research rubber band powered cars.
- Use the Engineering Process to design, build and test rubber band powered car.
- Collect and analyze data.
- Evaluate competing design solutions based upon agreed-upon design criteria.

- Analyze and interpret data to determine similarities and differences among design solutions.

Assessments

Formative:
Discussion: How does technology help our lives?
Summative:
Choose a real-world problem and develop a solution to that problem. Present information to the class.
Benchmark:
Alternative:
Hockey Scholar on Everfi
STEM professions on Everfi
Rubber band car
Women in STEM Research project
Mars colony STEM project

Career Education

CRP1. Act as a responsible and contributing citizen and employee.
CRP4. Communicate clearly and effectively and with reason.
CRP12. Work productively in teams while using cultural global competence.

21st Century Skills

Propose various designs for cars/test with time vs. distance trials.
Design and construct boats that can successfully carry and support maximum weight.
9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.
9.3.ST-SM.3 Analyze the impact that science and mathematics has on society.

Interdisciplinary Connections

Mathematics:
Power of 10 video; scale- Statistics+Probability-6SP
ELA:
Open-Ended Real World Application Questions, analogies
RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Technology Integration

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STEMScopes program (Time vs. Distance) TECH.8.1.8.C- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge	
Time Frame	**7 weeks**

Topic

Physical Science: Matter and Its Interactions

Essential Questions

- What is matter?
- How does matter change?
- How does heat (adding or removing) cause phase changes?

Enduring Understanding

- Substances are made from different types of atoms, which combine with one another in various ways.
- Atoms form molecules that range in size from two to thousands of atoms.
- Each pure substance has chemical and physical properties that can be used to identify it.
- Substances can react chemically in characteristic ways. In a chemical process, the atoms that make up the original substance are regrouped into different molecules, and these new substances have different properties from those of the reactants.
- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other.
- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide.
- In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.
- The change of state that occur with variations in temperature or pressure can be described and predicted using these models of matter

Alignment to Standards

MS-PS1-1
MS-PS1-2

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Learning Activities

- Metric Measurement stations
- Metric Olympics
- Density of Solids Lab
- Density of Liquids Lab
- Density Liquid Layering Activity
- Lava lamp engineering activity
- PhET Module Density Activity
- PhET Module: States of Matter Activity
- Density of Gases demonstration
- Fizz Quiz Lab
- Candle Lab
- Gobstoppers Lab
- Potato Lab'
- Claim-Evidence-Reasoning:Egg demonstration
- Physical vs. Chemical Changes brochure
- Cooking Lab for chemical/physical changes
- Station Lab for physical/chemical changes

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Assessment

Formative:
Formative assessments: exit slip-What are the three states of matter?
Do Now: Which state of matter has the most motion in the particles?
Journal entry: Choose a room in your house and explain how chemistry is used there.
Benchmark:
Summative:
Chapter test: States of matter, physical and chemical changes, density
Alternative:
States of matter comic strip
Defined Stem: Icy roads

Career Education

CRP12. Work productively in teams while using cultural global competence.

21st Century Skills

Research and present claims regarding the pros and cons of chemical changes with the burning of fossil fuels.
9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems

Interdisciplinary Connections

Mathematics:
Graphing- Statistics+Probability-6SP
ELA:
Open Ended Real World Application Questions
RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration

Technology Integration

Video-Streaming (Physical and Chemical Changes)
Demonstrations (Phase Changes)
TECH.8.1.8.A- Demonstrate knowledge of a real world problem using digital tools

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Time Frame	**6 Weeks**

Topic

Earth Science: Earth's Place in the Universe

Essential Questions

- Why does the night time sky change?
- What role does gravity play in our solar system, galaxy and universe?

Enduring Understanding

- Patterns of the apparent motion of the sun, the moon and stars in the sky can be observed, described, predicted and explained with models.
- Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.
- The solar system consists of the sun and a collection of planets, their moons and asteroids that are held in orbit around the sun by its gravitational pull on them.
- The solar system appears to have formed from a disk of dust and gas, drawn together by gravity

Alignment to Standards

MS-ESS1-1 MS-ESS1-3
MS-ESS1-2

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● Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

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Learning Activities

- Computer visualizations of elliptical orbits of planets
- Lab Activity- Effects of gravity on weight
- Constellation Activity
- Build a Mars landing explorer STEM activity
- Bottle Rocket STEM activity
- Claim Evidence Reasoning - The Mysterious Planet Nine
- Rotate, Revolve or both CER activity
- Big Bang graphic organizer

Assessment

Formative:
Discussion: How did the Earth form?
Discussion: Revolution or rotation?
Summative:
Chapter test: Space
Vocabulary quiz: Space
Benchmark:
Alternative:
Gravity lab
Defined Stem: Spaceport

Career Education

CRP1. Act as a responsible and contributing citizen and employee.
CRP12. Work productively in teams while using cultural global competence

21st Century Skills

Create designs for a roving space vehicle that can explore the surface of the three inner planets.

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9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.

Interdisciplinary Connections

Social Studies:
Latitude/Longitude , hemispheres- reasons for the seasons
6.1.8.B.1.b- Analyze the world in spatial terms (e.g., longitude, latitude)
Mathematics:
Graphing and calculating weight on different planets- Statistics+Probability-6SP
ELA:
Open Ended Real World Application Questions
WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration

Technology Integration

Video-Streaming (Astronomy)
Planetary orbit animation
Demonstrations (FOSS Astronomy Activity)
TECH.8.1.8.C- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge

Time Frame	**1 Week**

Topic

Year End Review Google Slide Presentation

Essential Questions

- How can you use technology appropriately to research one key concept studied this year?
    - What type of presentation is visually appealing and informative?
- How can you create a presentation that demonstrates the student's understanding of the topic?

Enduring Understanding

- Specific to student topic.

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Alignment to Standards

MS-ESS 1-1, 1-2
MS-ESS 2-4, 2-5, 2-6
MS-ESS 3-1, ESS 3-2, ESS 3-3, ESS 3-4, ESS 3-5,
MS-PS 1-1, 1-2, 1-4
MS-LS 1-1, 1-2

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Learning Activities

- Student driven topic determination.
- Develop minimum of seven Google Slides.
- Create presentation to include: explanation of topic, at least 10 detailed facts, description of lab project or activity, and pictures, games, animations or videos to enhance presentation.
- Presentation to class.

Assessments

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Formative:
Discussion of presentation styles and options most correlated to the student.
Summative:
Presentation of completed project
Benchmark:
End of year assessment (content)
Alternative:

Career Education

CRP1. Act as a responsible and contributing citizen and employee.
CRP4. Communicate clearly and effectively and with reason.

21st Century Skills

9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.
9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.
9.3.ST-SM.3 Analyze the impact that science and mathematics has on society

Interdisciplinary Connections

Mathematics:
Data analysis, Computational skills- Statistics+Probability-6SP
ELA:
Research , Open-ended Real World Application Questions
WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration

Technology Integration

TECH.8.1.8.A- Demonstrate knowledge of a real world problem using digital tools.

Modifications (ELL, Special Education, At-Risk Students, Gifted & Talented, & 504 Plans)

ELL:

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary

- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

Supports for Students With IEPs:
- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

At-Risk Students:
- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson
- Work in a small group
- Lesson taught again using a differentiated approach
- Allow answers to be given orally or dictated
- Use visuals / Anchor Charts
- Leveled texts according to ability

Gifted and Talented:
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Expose students to beyond level texts.

Supports for Students With 504 Plans:
- Follow all the 504 plan modifications
- Text to speech/audio recorded selections
- Amplification system as needed
- Leveled texts according to ability
- Fine motor skill stations embedded in rotation as needed
- Modified or constrained spelling word lists
- Provide anchor charts with high frequency words and phonemic patterns

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