Middle School Science Curriculum

September 2011

Revitalization Personnel:

- Maree Griffin – Curriculum Supervisor
- Joanna Chierici – 8th grade Teacher
- Matthew Zdziarski – 7th grade Teacher
- Keith Redler – 6th grade Teacher

- Michael Dzwonar – Assistant Superintendent
- Edward Forsthoffer - Superintendent
Middle School Science Philosophy

The foundation of the East Windsor Middle School Science Curriculum is the belief that all students must develop scientific literacy to become productive members of society. In support of this, the curriculum is aligned with the National Council of Teachers of Science and the New Jersey Core Content Standards for Science. The curriculum is designed to assure that each student encounters an appropriate level of challenge while developing critical thinking and problem solving skills. The curriculum document and appendix are designed to provide teachers with a robust set of tools that can be utilized to provide an environment that stimulates enthusiasm for scientific learning, develops a strong foundation of basic science skills, enhances the application of skills through meaningful experiences, and empowers students to maximize their individual potentials for scientific literacy. Building on the foundation of the middle school science curriculum requires ongoing and sustained support of the professional staff by providing the resources and professional development to implement the district’s student centered vision of instruction.

The contents of this guide identify and describe essential learning that all students must know and be able to do in order to demonstrate competency in science. This document also addresses the skills of critical thinking, problem solving, and integration, which will be needed for success now and in the future.

Standards and Benchmarks:

Student proficiencies are identified by the New Jersey Core Curriculum Science Standards.

The New Jersey Core Curriculum Science Standards describe what students should know and be able to do upon completion of a thirteen-year public education. Revised every five years, the standards provide local school districts with clear and specific benchmarks for student achievement in nine content areas.

In order to judge progress toward these standards, benchmarks describe the specific content and skills students need to master at each grade level in order to meet each standard. Unit Design, Curriculum Maps, Data, Essential Questions, and Assessment drive instruction. Teachers and administrators spend significant time analyzing these benchmarks, and they should serve as the basis for evaluating student progress.

Unit Design:
In order to help students meet the standards and benchmarks, staff design units of study to create deep and meaningful learning experiences that require students to be able to analyze, synthesize, and evaluate the work in which they are engaged. The units consist of essential questions that determine the critical focus for learning, the content and skills to be learned, the assessments that will determine if students are meeting benchmarks and reaching deeper levels of thinking, and the learning activities that will support students in their academic and social progress.

Curriculum Maps:

Curriculum mapping serves as a tool for teachers to extend the curriculum into a scope and sequence based on the needs of the students the teacher is working with for that school year. Maps will include essential questions, as well as the content and skills to focus on for each period of time (e.g., month, marking period). Curriculum maps help teachers plan out the year’s instruction so that students can meet the standards through a series of units that offer students meaningful and enriched learning experiences.

Data:

Because of the many sources of assessment data, it is important for the district, as well as each building, to create systems for collecting, analyzing, and using data to inform decision making with instructional and programmatic issues. Through a program of professional development, teachers will become increasingly sophisticated in the use of state and local assessment data to examine student progress and make appropriate adjustments in their units and lessons.

Essential Questions:

Strong essential questions bring focus and strength to a unit of study. Essential questions allow learners to focus on the significant issues of a unit which have long term meaning in the lives of the students. One of the strengths of essential questions is that they demonstrate the integration of many disciplines into the student’s inquiry and exploration of the unit. Essential questions can also bring focus to a particular lesson or discussion from which students can learn to use essential questions to focus and enhance their own sense of inquiry. Our ultimate aim is to provide rich models of high quality questions so that students will learn how to ask meaningful questions about themselves and their world.

Assessment:

Using assessments based on the benchmarks that suggest what students should know and be able to do, teachers determine what constitutes effective evidence that students have met the benchmarks, and answered the essential questions of the unit. Ongoing assessment of students will be a part of each unit. Teachers will use performance based assessment checklists, extension activities, embedded assessments, student self assessments, rubrics, graphic organizers, journal entries, projects, reports, conferences, and tests to monitor and evaluate the academic progress of all students. The results of these assessments will become a powerful force for teachers to alter their instructional practices in order to enhance student achievement.
It is important to note based on student performance data and teacher articulation, sections of this document, namely, the scope and sequence, will be updated on an annual basis. These updates will be made available to teachers in digital format so that student performance data can be used to support the instructional staff with re-mapping, and best practices instructional activities to support the staff in implementing the district vision for student achievement in science. Any changes in student outcomes or benchmarks will be made public.

New Jersey Core Curriculum Content Standards for Science
(Adapted to meet the EWRSD vision)

The Vision

The vision of the science standards is focused on achieving one crucial goal:

To enable ALL of New Jersey’s children to acquire the scientific skills, understandings, and attitudes that they will need to be successful in their careers and daily lives.

Perhaps the most compelling reason for this vision is that all of our children, as well as our state and our nation, will be better served by higher expectations, by curricula that go far beyond basic skills and include a variety of scientific models, and by programs which devote a greater percentage of instructional time to inquiry and active learning.

The vision of success for all students in science depends on:

- establishing learning environments that facilitate student learning of science;
- a commitment to equity and to excellence; and
- defining the critical goals of science education today--what students should know and be able to do (i.e., content and processes).

The Vision – Learning Environments

- Students excited by and interested in their activities
• Students learning important scientific concepts rather than simply memorizing and practicing procedures
• Students posing and solving meaningful problems
• Students working together to learn science
• Students writing and talking about science topics every day
• Students using models and manipulatives as important tools of learning
• Students whose teachers who have high expectations for ALL of their students
• Students being assessed by a variety of assessment strategies, not just traditional short-answer quizzes or tests

The Vision – Equity and Excellence

• Setting high expectations.
• Providing opportunities for success.
• Encouraging all students to go beyond the standards.

What Students Should Know and Be Able to Do

New Jersey’s science standards rest on the notion that an appropriate science curriculum results from a series of critical decisions about three inseparably linked components: content, instruction, and assessment. The standards will only promote substantial and systemic improvement in science education if the what of the content being learned, the how of the problem-solving orientation, and the where of the active, equitable, involving learning environment are synergistically woven together in every classroom. The science environment of every child must be rich and complex and all students must be afforded the opportunity to develop an understanding and a command of science in an environment that provides for both affective and intellectual growth.

Science Standards and Strands

There are four standards altogether, each of which has a number of lettered strands. These standards, and their associated strands, are enumerated below:

5.1 Science Practices

A. Understand Scientific Explanations
B. Generate Scientific Evidence Through Active Investigations
C. Reflect on Scientific Knowledge
D. Participate Productively in Science
5.2 Physical Science

A. Properties of Matter
B. Changes in Matter
C. Forms of Energy
D. Energy Transfer and Conservation
E. Forces and Motion

5.3 Life Science

A. Organization and Development
B. Matter and Energy Transformations
C. Interdependence
D. Heredity and Reproduction
E. Evolution and Diversity

5.4 Earth Systems Science

A. Objects in the Universe
B. History of Earth
C. Properties of Earth Materials
D. Tectonics
E. Energy in Earth Systems
F. Climate and Weather
G. Biogeochemical Cycles
Course Description:

The Sixth Grade science program uses a hands-on inquiry based science approach. Students engage in active investigations in physical science, life science, and earth/environmental science.

Students in grade six conduct investigations and begin to apply mathematical skills in evaluating and analyzing variables of data. They identify basic skills of the scientific inquiry process, (i.e.: how thinking scientifically is helpful in daily life and how technological advances affect the quality of our life). Students will research how men and women of other countries and cultures contribute to science.

Sixth-grade students will identify earth processes and study mapping of the earth’s surface. This will integrate with the sixth grade social studies introduction to geographical features. This will lead to further investigations on plate tectonics and the relationship between the earth, moon and sun as it relates to earth’s processes.

The interdependence of human body systems will be analyzed to understand the flow of energy in both humans and their environment. Students will access knowledge to explain how energy entering the ecosystems, such as sunlight, supports the life of organisms through photosynthesis and the transfer of energy through the interactions of organisms and the environment.

Students will assess the role of forces and motion and apply Newton’s laws to understand forces such as gravity, friction, and air resistance.

Course Goals:
The goals for this course are that each student will meet the NJCCCS set for proficiency demonstrating an understanding of scientific concepts and process skills. Students should:

- Design and construct conceptual and physical models.
- Look for relationships between structure and function of materials and systems.
- Organize and analyze data from investigations with physical objects and systems.
- Apply mathematics in the context of science.
- Acquire vocabulary associated with topics and investigations.
- Gain confidence in their abilities to solve problems.
- Learn that there is often more than one solution to a problem.
- Communicate ideas to peers and work in a collaborative scientific manner.
- Use scientific thinking processes to conduct investigations and build explanations:
  - observing, communicating, comparing, organizing, and relating.
- When given a problem, plan and conduct experiments in which they apply scientific methods.
- Distinguish between factual statements and inferences.
- Raise questions about objects, events, and processes that can be answered through scientific investigation.
- Accept and use scientific evidence to help resolve ecological problems.

Inherent in the Science curriculum are the following study skills. These skills are not studied in isolation. Rather, it is expected that they will be integrated into curriculum, assessment and instruction.

- Reading for Meaning
- Task Analysis
- Time Management
- Building Vocabulary
- Active Listening Strategies
- Working with Graphs
- Following Directions
Thinking and Working Like a Scientist

*Introduce instructional procedures and methodologies to be used throughout the year*

- How does one work safely and effectively with others in the science environment?
- How can scientific processes be used to solve real-world problems?
- How can I answer my own questions?
- What steps might be used to solve a scientific question?
- What is the difference between variables, controls and constants?
- How does a scientist record information?
- How does a scientist make notations?
- How does accuracy in record keeping provide credibility for peer review?
- How can two separate groups of scientists have different conclusions using the same data?

MP 1: Erosion and Weathering

- Rocks and Weathering
- Soil formation
- Soil Conservation
- Water Erosion
- Glaciers
- Waves
- Wind

MP 2: Plate Tectonics/Earthquakes

- Earth’s Interior
- Drifting Continents
- Sea-Floor Spreading
- Forces in the Earth’s Crust
- Monitoring Earthquakes

MP 2: Earth Moon Sun System

- Earth in Space
- Gravity and Motion
- Phases, Eclipses, and Tides
- Earth’s Moon

MP 3: Human Body

- Body Organization and Homeostasis
- Digestion and Absorption
- Body’s Transport System
- Blood Vessels and Lymph

MP 3: Populations & Ecosystems

- Living Things
- Population Factors
- Interactions Among Living Things
- Energy Flow
Biomes

**MP 4: Motion and Force**
- Describing/ Measuring Motion
- Force and Gravity
- Newton’s Laws
- Forces in Liquids
- Bernoulli’s Principle

**MP 4: Electricity**
- Charge and Static Electricity
- Electric Current
- Circuits/ Power

**MP 4: Science Olympiad**
- Final cumulative unit to assess application of science process skills through hands on inquiry investigations

**Resources:**
- Prentice Hall small book series on Earth Science
- Current Science (7/8)
- Scholastic Super Science (6/7)
- Teacher Portal on On-Course (web portal)
- Science Kits/ Materials
- Discovery Streaming

**Major Student Activities**

The sixth grade science course incorporates a wide range of teaching methodologies and authentic assessment strategies that designed to consistently engage students in their own learning and assessment. These include, but are not limited to:
- demonstrations
- core lessons
- small discussion groups
- cooperative learning
- discovery investigations
- interactive notebooks
- learning journals (blogs)
- learning stations
- simulations
- choice boards
- problem based/inquiry learning
- labs and lab reports
- oral/visual presentations
- interactive note-taking
- position essays
- streaming video
- webquests
- scavenger hunts
- field trips/ field journals
- video presentations/ filming

**Major Evaluation Strategies:**
Assessments are ways to measure what students are learning and alter instruction to accommodate needs and proficiencies. A variety of assessment methods are used to evaluate student understanding. The science classroom affords teachers generous opportunities to assess pupils authentically as they perform a variety of meaningful tasks. Students will be routinely observed researching and communicating ideas, announcing hypotheses, conducting experiments, gathering and recording data, presenting results, etc.

Means of assessment should include:

- Anecdotal records
- Interactive Science Notebook
- Checklists for task/lab completion
- Rubrics
- Formal and informal student observations
- Summative evaluation
- Presentations
- Tests: end of unit or chapter quizzes
- Dialogue, reflection and feedback
- Teacher check lists that document such attributes as:
  - motivation
  - responsibility
  - teamwork
  - positive work habits
  - familiarity/facility with equipment, supplies, specimens, etc.

- Benchmark Assessments
- Projects
- Learning Stations/ small group customized investigations
- Reflective Journals
- Rubric Based Performance Assessments
- Portfolios
- Teacher Observation
- Student Goal Setting Conferences
- Self Assessment
- Peer Assessment

**Technology Integration**

- Web Portal for Scaffolding
- Webquests/ Scavenger Hunts
- Web Based Mini Units
- WIKIS/ On Line Journals
- Simulations / streaming video
- Science Explorer On Line Edition & Teacher Resource Components
- NSTA on Line journal & Sci-Links
<table>
<thead>
<tr>
<th>Month</th>
<th>Skill: Reading/ Writing</th>
<th>Product</th>
</tr>
</thead>
</table>
| September     | • Vocabulary acquisition strategies  
• Accountable Talk  
• THIEVES  
• Strategies for text interaction (Think-Mark, Text Mark-Up)  
• Utilizing Graphic Organizers, Timelines | • Cooperative groups utilizing ATS  
• Independent Reading with Text Mark Up tools  
• Baseline Response to Non-fiction  
• ISSN set up and use throughout the year. |
| October/ November | • Main idea and supporting details  
• Paraphrasing  
• Comprehension monitoring strategies (SQ3R, LINK, gallery walks, QAR, and Think-A-Loud)  
• Narration: ISSN Journaling, narrative writing using critical academic vocabulary | • Response to Text: paraphrased reading  
• Narrative task, RAFT  
• Comprehension activities using monitoring strategies  
• Noting Main ideas and supporting details in response to ISN notes (utilizing a variety of graphic organizers, matched to purpose) |
| December/January | • 5 W’s to identify information in text  
• Utilizing Visuals ( maps, graphs, pictures to support oral arguments/contentions)  
• Persuasive language to debate or convince an audience  
• Persuasive writing: convincing your audience using facts. | • Comprehension monitoring activities with the 5 W’s.  
• Participate in a Jigsaw, fishbowl utilizing non-fiction text enhancements ( photos, timelines, graphs, etc)  
• Persuasive paragraph in response to current issue |
| February      | • Sequencing  
• Utilizing graphic organizers to identify organizational patterns in nonfiction text. | • System, or inter-related events sequencing (cycle): diagram and explain in written captions.  
• Responses to text utilizing a variety of graphic organizers, matched to purpose: ISSN, and SCR |
<table>
<thead>
<tr>
<th>Grade 6 Science Literacy Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>March</strong></td>
</tr>
<tr>
<td>• Fact V. Opinion (Perspective)</td>
</tr>
<tr>
<td>• ISN Journaling: developing</td>
</tr>
<tr>
<td>opinions, utilizing facts.</td>
</tr>
<tr>
<td>• Perspective piece on a current</td>
</tr>
<tr>
<td>science topic.</td>
</tr>
<tr>
<td><strong>April/May</strong></td>
</tr>
<tr>
<td>• RACE, using evidence from text</td>
</tr>
<tr>
<td>• Compare/contrast</td>
</tr>
<tr>
<td>• Cause and effect (utilizing text</td>
</tr>
<tr>
<td>features to establish cause and</td>
</tr>
<tr>
<td>effect relationships in text)</td>
</tr>
<tr>
<td>• Compare and contrast piece</td>
</tr>
<tr>
<td>• Modeling of cause and effect,</td>
</tr>
<tr>
<td>infusion in small group tasks</td>
</tr>
<tr>
<td>based on understanding of signal</td>
</tr>
<tr>
<td>words and phrases.</td>
</tr>
<tr>
<td><strong>June</strong></td>
</tr>
<tr>
<td>• Analyzing scientific diagrams and</td>
</tr>
<tr>
<td>lab conclusions</td>
</tr>
<tr>
<td>• Picture/Diagram Analysis</td>
</tr>
<tr>
<td>• OEQ Response, SCR to information</td>
</tr>
<tr>
<td>in mixed graphic and written</td>
</tr>
<tr>
<td>form</td>
</tr>
<tr>
<td>Major Units</td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>I. Working in a Science Classroom</td>
</tr>
<tr>
<td>II. Erosion/Weathering</td>
</tr>
<tr>
<td>IV. Tectonics</td>
</tr>
<tr>
<td>V. Earth, Moon, Sun</td>
</tr>
<tr>
<td>VI. Human Body Systems</td>
</tr>
<tr>
<td>VII. Populations/Ecosystems</td>
</tr>
<tr>
<td>VIII. Electricity</td>
</tr>
<tr>
<td>IX. Force/Motion</td>
</tr>
<tr>
<td>X. Science Olympiad</td>
</tr>
</tbody>
</table>

**State Testing** = (5 Days)  **Benchmark Assessments Quarterly** (4 days)
<table>
<thead>
<tr>
<th>Skill Area</th>
<th>Sixth</th>
<th>Seventh</th>
<th>Eighth</th>
</tr>
</thead>
</table>
| Scientific Method           | • Conduct a controlled experiment and explain findings in a standard lab protocol.  
                                | • Utilize a lab report to display the results of an investigation  
                                | • Examine results and discuss alternative possibilities to increase understanding. | • Run a controlled experiment recording data and reporting out results.  
                                | • Conduct an experiment with a manipulated variable and explain findings in a standard lab protocol.  
                                | • Introduce experimental design procedures. Utilize experimental design procedures to discover the answer to a teacher-generated question.  
                                | • Articulate the results of a lab report: using charts, displays to showcase conclusions. | • Examine evidence from data collection to evaluate a lab experiment or one’s hypothesis.  
                                | • Consistently apply measurements for SI units.  
                                | • Utilize SI units to make predictions, express results, and show findings.  
                                | • Speak to reasonability of results.  
                                | • Evaluate data for accuracy. |
| Measurement                 | • Demonstrate the ability to accurately measure items/objects using scientific tools: ruler, graduated cylinder, stop watch, balance.  
                                | • Demonstrate understanding of the prefixes used in the SI, using the appropriate unit in different settings. | • Calculate differences between measurements and or compare measurements.  
                                | • Predict/identify units and estimates using accurate units and compare with other students’ data. | • Consistently apply measurements for SI units.  
                                | • Utilize SI units to make predictions, express results, and show findings.  
                                | • Speak to reasonability of results.  
                                | • Evaluate data for accuracy. |
| Reasonability of Estimates and Observations | • Demonstrate the ability to make observations using more than visual sense.  
                                | • Read a chart, graph, or table and articulate results. | • Accurately record observations and methods used to observe.  
                                | • Show results in a student generated chart, graph, or data table. | Develop a logical question based on observations.  
                                | Create an original chart, graph, or data table demonstrating ability to explain results as tabulated and apply proper labels. |
| Discussions                 | • Engage in multiple forms of discussions to process, make sense of, and learn from others’ ideas, observations, and experiences.  
                                | • Work cooperatively in the context | • Engage in multiple forms of discussions to process, make sense of, and learn from others’ ideas, observations, and experiences.  
                                | • Work cooperatively in the context of scientific investigations and model building. |
Inquiry Based Science

Students should be “doing science” weekly. With that as a key principle, the following are helpful to keep in mind:

When implementing inquiry in science:

- Ask open-ended questions
- Allow wait time after asking questions
- Avoid telling students what to do
- Avoid rejecting and/or discouraging student ideas or behaviors
- Encourage students to find solutions on their own
- Encourage collaboration among students
- Maintain high standards and order
- Develop and use inquiry-based assessments to monitor students’ progress
- Know that inquiry can be challenging for some students and be prepared to provide more guidance to those students when signs of frustration appear

The following skills are taught, reinforced through monthly lab experiences, and expected to be mastered by the end of eighth grade.

- **Classifying** – arranging or distributing objects, events, or information representing objects or events in classes according to some method or system
- **Communicating** – giving oral and written explanations or graphic representations of observations
- **Comparing and contrasting** – identifying similarities and differences between or among objects, events, data, systems, etc.
- **Creating models** – displaying information, using multisensory representations Gathering and organizing data – collecting information about objects and events which illustrate a specific situation
- **Generalizing** – drawing general conclusions from particulars
- **Identifying variables** – recognizing the characteristics of objects or factors in events that are constant or change
- **Inferring** – drawing a conclusion based on prior experiences
- **Interpreting data** – analyzing data that have been obtained and organized by determining apparent patterns or relationships in the data
- **Making decisions** – identifying alternatives and choosing a course of action from among the alternatives after basing the judgment for the selection on justifiable reasons
- **Manipulating materials** – handling or treating materials and equipment safely, skillfully, and effectively
- **Measuring** – making quantitative observations by comparing to a conventional or nonconventional standard
- **Observing** – becoming aware of an object or event by using any of the senses (or extensions of the senses) to identify properties
• **Predicting** – making a forecast of future events or conditions expected to exist

Through their experience in middle school science (6-8), it is expected that students will be held to the following standards and assessment criteria should provide feedback on student ability to:

- Follow safety procedures in the classroom and laboratory.
- Know and apply the steps of the scientific method.
- Safely and accurately use the following measurement tools:
  - metric ruler
  - hand lens
  - spring scale
  - balance
  - graduated cylinder
  - thermometer.
  - stopwatch
- Use appropriate units for measured or calculated values.
- Recognize and analyze patterns and trends.
- Sequence events.
- Identify cause-and-effect relationships
- Determine the density of liquids, and regular- and irregular-shaped solids.
- Determine the weight and volume of common objects using appropriate tools.
- Manipulate a compound microscope to view microscopic objects (look at different types of cells and tissues).
- Determine the size of a microscopic object using a compound microscope.

Below are the process standards that should be considered when planning inquiry investigations throughout the year:

**Evidence is generated and evaluated as part of building and refining models and explanations.** 5.1.8.B.1 Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.

**Mathematics and technology are used to gather, analyze, and communicate results.** 5.1.8.B.2 Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.

**Carefully collected evidence is used to construct and defend arguments.** 5.1.8.B.3 Use qualitative and quantitative evidence to develop evidence-based arguments.

**Scientific reasoning is used to support scientific conclusions.** 5.1.8.B.4 Use quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
Scientific models and understandings of fundamental concepts and principles are refined as new evidence is considered. 5.1.8.C.1 Monitor one’s own thinking as understandings of scientific concepts are refined.

Predictions and explanations are revised to account more completely for available evidence. 5.1.8.C.2 Revise predictions or explanations on the basis of discovering new evidence, learning new information, or using models.

Science is a practice in which an established body of knowledge is continually revised, refined, and extended. 5.1.8.C.3 Generate new and productive questions to evaluate and refine core explanations.

Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work. 5.1.8.D.1 Engage in multiple forms of discussion in order to process, make sense of, and learn from others’ ideas, observations, and experiences.

In order to determine which arguments and explanations are most persuasive, communities of learners work collaboratively to pose, refine, and evaluate questions, investigations, models, and theories (e.g., argumentation, representation, visualization, etc.). 5.1.8.D.2 Engage in productive scientific discussion practices during conversations with peers, both face-to-face and virtually, in the context of scientific investigations and model-building.

Instruments of measurement can be used to safely gather accurate information for making scientific comparisons of objects and events. 5.1.8.D.3 Demonstrate how to safely use tools, instruments, and supplies.

Organisms are treated humanely, responsibly, and ethically. 5.1.8.D.4 Handle and treat organisms humanely, responsibly, and ethically.
Appendix Science 6-8

Differentiation Strategies

The following differentiation Strategies are to be embedded in Classroom instructional lessons:

- Tiered Tasks
- Product Options
- Learning Stations
- Learning Contracts
- Scaffolded Lessons
- Guided Reading
- Interactive Note-taking
- Pre-Assessment for Compacting
- Self Assessment/ Learning Conferences
- Anchor Activities
- Research and Independent Study
- Flexible Grouping
- Alternative Assessments
- Think Tac Toe
- Choice Boards
- Tiered Rubrics
- Question Choices
Instructional Strategies

- **Scaffolding**: Teachers model a complex activity to show students how to perform the activity; then the activity is repeated with less and less teacher input as students perform the activity independently.

- **Learning Centers**: Are a collection of materials and activities designed to teach, reinforce, or extend students’ knowledge, understanding, and skills.

- **Computer as a Tool**: The computer is used as a tool to help students accomplish a learning task. Example: United Streaming

- **Computer Assisted Instruction**: Computer Software is used for instructional delivery. Examples: Study Island,

- **Identify Similarities and Differences**: Compare and Contrast is used to help students distinguish between types of ideas or group like ideas. It can be used to help students identify language cues, clarify thinking and define ideas. It can also be used to facilitate indirect instruction through concept formation or concept attainment.

- **Inquiry Learning**: This is an instructional method by which students use a variation of the scientific method of inquiry as a means to study a topic in depth; the goal is both deeper learning about the focus of inquiry and the processes of inquiry as a learning method.

- **Think-Pair-Share (T-P-S)**: This instructional strategy developed by Frank Lyman (1992), is used to engage all learners in thinking and talking about a question or issue important to a current area of study. The teacher begins by posing an important thought question. Students are asked to write down ideas or think about the question, working silently until the teacher call time (usually two or three minutes). This is the thinking phase of the process. In the second phase, pairing, students turn to a peer and exchange their thoughts about the question. Sharing, the teacher restates the question for the class as a whole, and leads the class in a discussion of the question.

- **Graphic Organizers**: A graphic organizer is usually a one page form with blank areas for the student to fill in related ideas and information. Some graphic organizers are very specific; others can be used with many topics. The organizer gives the student another way to see the information. Some of the organizers allow for the information to be written or drawn, opening the activity up for younger grades.

- **Cooperative Learning**: In cooperative learning, heterogeneously grouped students work together on interdependent tasks in which all students must participate and contribute in order to succeed.
- **Journals**: Students record their thoughts and experiences in regular accounts, usually informally. The writing is often used to encourage reflection or exploration of ideas of interest to the students.

- **Learning Contracts**: Learning contracts provide a method of individualizing instruction and developing student responsibility. They permit individual pacing so that students may learn at the rate at which they are able to master the material. Learning contracts can be designed so that students function at the academic levels most suitable to them and work with resource materials containing concepts and knowledge that are appropriate to their abilities and experiences. Although this method focuses on the individual, learning contracts also provide an opportunity for students to work in small groups. The teacher may select this approach for some students to support them as they learn to work independently.

- **Flexible Grouping**: Teachers use various groupings of students depending upon specific activities planned. Teachers are encouraged to use a range of grouping and instructional strategies and to select those strategies that are most likely to be successful with specific students given a particular lesson.

- **Differentiated Instruction**: Differentiated Instruction is a teaching philosophy based on the premise that teachers should adapt instruction to student differences. Rather than marching students through the curriculum in lockstep, teachers should modify their instruction to meets students’ varying readiness levels, learning preferences, and interests.

- **Tiered Assignments**: Is a process of adjusting the degree of difficulty of a question, task, or product to match a student’s current readiness level.

- **Socratic Seminars**: These whole class dialogues explore ideas, values, and issues drawn from readings or works of are chosen for their richness. Leaders help participants to make sense of a text and of their own thinking by asking questions about reasoning, evidence, connections, examples and other aspects of sound thinking. A good seminar is more devoted to making meaning that to mastering information. Participants are actively engaged in rigorous critical thought. They must involve a relatively short text, piece of art, etc. and after the seminar are often followed by periods of reflection that may be written or spoken.

- **Jigsaw**: Students are assigned to groups to read about one aspect of a francophone country’s culture, then the groups are “jigsawed” so that each newly configured group has one expert from each of the base groups

- **Individual / Partner/Small Group Seminars**: These seminars are more formal and focused than large group seminars. A text or portion of a text is chosen and the student(s) analyze the text based on the models and guided practice from class. The students then create a thesis that needs to
be supported by evidence from the text and sets the seminar up in an outline form. Partners and group members discuss the texts, but each of the individuals is responsible for submitting and presenting their poem or section of a novel.

- **Exhibitions:** Exhibitions are presentations that can be done by individuals, partners, and/or small groups. They are generally presentations that are broader in scope; a student demonstrates his/her overall understanding of the unit.

- **Inquiry Board:** Create a space somewhere in your classroom where students can post unanswered questions that come up. They may be in response to a variety of topics, texts, writers, etc. A student can grab a question and research and answer it to stimulate a piece of writing or discussion.
Learning Accommodations

The following learning accommodations are provided in the SS Curriculum for middle school.

The accommodations (as recommended by the NJ Department of Education) are considered:

Accommodations and Modifications

- Preferential seating – including seating near the front of the room, low-distractibility work area, near student role model, etc.
- Additional time as needed for assignments, assessments, and activities.
- Providing frequent breaks.
- Providing alternate versions of materials that are appropriate for the individual reading level of the student.
- Reading directions aloud.
- Breaking assignment into parts.
- Repeating, clarifying, or rewording directions and/or questions.
- Providing written directions to support verbal instruction.
- Providing visual cues.
- Masking portions of reading or test questions to eliminate visual distracters.
- Allowing students to type written responses.
- Terminating a section of test or portion of assignment when student has completed all items they are able and teacher has ascertained that the student has demonstrated understanding of the topic.
- Allowing student to orally respond to questions.
- Frequently checking for understanding.
- Allowing student the opportunity to re-take or re-do assignments for the benefit of learning.
- Ensure that the student understands directions and assignment expectations before working independently.

Learning Environment:

- Working independently
- Working with a peer tutor
- Participating in a small group/classroom
- Participating in a large group/classroom
- Listening to audio
- Structured learning environment
- Computer-aided instruction

Adaptation of Materials:

- Reading materials scaffolded to appropriate grade level
- Aide/Teacher/Peer to assist in the reading of materials, taking notes
- Peer or small group discussion of materials
- Recording of required readings
• Highlighted materials for emphasis
• Altered format of materials
• Study aids/manipulatives
• Outlines and study guides

**Alterations of Assignments:**
• Simplified homework assignments
• Reduced assignments
• Prioritize assignments
• Extra time for assignments
• Opportunity to respond orally
• Individual contracts
• Emphasis on major points
• Exemption from reading before peers
• Assistance in class discussions
• Special projects in lieu of assignments

**Instructional Accommodations:**
• Shortened, simplified instructions
• Repeated instructions
• Opportunity to repeat instructions
• Opportunity to write instructions
• Written instructions
• Visual aids (pictures, flash cards, etc.)
• Auditory aids (cues, cds, etc.)
• Instructional aids
• Extra time for oral response
• Extra time for written response
• Exams of reduced length
• Oral exams
• Open book exams
• Written review for exams
• Preview of test questions
• Study carrel for independent work
• Frequent feedback
• Immediate feedback
• Checks for understanding
• Minimize auditory distractions
• Encourage participation
• Extended “wait time”
• Administer oral testing
• Use taped textbooks
• Allow calculators
• Do not grade for spelling
• Allow note-taker use
• Use cue cards for steps of task
• Use assistive devices
• Use study guides
• Provide study skills instruction
• List formulas for tests
• Provide computer-assisted learning
• Allow extended time for testing
• Allow extended time for writing assignments
• Provide more time for practice of certain tasks
• Provide computers for writing tasks
• Use readers
• Highlight important facts in text
• Give written rather than oral directions
• Hold test review sessions
• Provide conversion tables
• List vocabulary for tests
• Tape record lectures
• Break difficult tasks into smaller parts; teach each part separately if needed
• Provide student with optional quiet spot (possibly isolated) to do academic work or to avoid punishment
• Provide frequent teacher/student contacts to help student start and remain on task
• Give much encouragement and praise
• Develop legitimate ways for student to have movement in class, limiting confinement
• Pace the work (e.g., twelve 5-minute assignments achieve more than one 45-minute assignment)
• Make allowances for inconsistent performance; build rapport; increase personal respect (students work harder when there is a personal relationship with the teacher)
• Assign alternative assignments to tap the student’s learning style
• Establish contracts (student-teacher, student-administrator, student-parent, parent-teacher)

**ELL Strategies**

The following ELL Strategies are to be embedded in Classroom instructional lessons:

**Continuous assessment and monitoring of student progress**
- Benchmark Assessments
- Student/teacher conferences
- Parent/teacher conferences
- Class participation
- Class work product
- Progress reports
- Student feedback
- Homework/projects

**Adjustment of instruction based on student needs and teacher reflection**
- Re-teaching using a variety of techniques and strategies
- Reinforcement of key concepts of lessons
- Teachable moments
The science curriculum includes the following technology integration components:

- Web Portal for Scaffolding/ weblinks
- Webquests
- Scavenger Hunts
- Web Based Mini Units
- WIKIS/ On Line Journals
- Simulations/ Migration on line Tracker
- United Streaming
- Science Explorer On Line text resources
- Lab Zone on line
- Discovery School simulations
- Study Island
- Glencoe On Line Text Student Addition & Teacher Resource Components
- NSTA on Line journal and Sci Links
- Inspiration
- Data Inspire
- flex-cams, digital cameras, microscopes

• Time flexibility
- Flexible small group instruction
- Student goal setting conferences
- Pre-introduce vocabulary/ concepts
- Review content on audio or provide listening/ speaking experiences to supplement reading
- Use of visual aids and gestures
- Conduct group discussions
- Use pictures and manipulatives to help illustrate concepts
- Use interactive dialogue journals
- Use TPR techniques (?)
- Present information in a variety of ways.
- Provide frequent summations of the salient points of a lesson, and always emphasize key vocabulary words.
- Repeat information and review frequently,
- Check for understanding frequently with required response back ( not a Y/N response.

Technology Integration
Content Literacy Integration

- Comprehension strategies for nonfiction text
- Summarize text passages [informational text]
- Main idea/detail [nonfiction]
- Infer using clues
- Fully develop ideas in writing with thorough support
- Organize writing [intro and conclusion]
- Create readable documents
- Communicate effectively [evaluate]
- Use content vocabulary accurately
- Distinguish between fact/opinion
- Make predictions, draw conclusions from ext.
- Develop research strategies and determining validity, reliability of sources

Career Integration
The following Workplace Readiness Standards are imbedded in the process activities for each unit, grades 6-8:

In each unit, career technology skills are infused. Student Outcomes include the following over each year’s course of study:

2.2 Select appropriate tools and technology for specific activities.
2.3 Demonstrate skills needed to effectively access and use technology-based materials through retrieving and managing information.
2.4 Develop, search, and manipulate databases.
2.5 Access technology-based communication and information systems.
2.7 Use technology and other tools to solve problems, collect data, and make decisions.
2.8 Use technology and other tools, including word-processing, spreadsheet and presentation programs, and print or graphic utilities, to produce products.
2.9 Use technology to present designs and results of investigations.
2.10 Discuss problems related to the increasing use of technologies.

Students will produce a finished product such as a multimedia presentation, a model, or a structure using technological equipment and processes. (Use of simulations, active art, digital cameras, video clips for students to share, teach, explain concepts)

Students will use computer data programs to record, process, and disseminate information (lab reports, graphic organizers, spreadsheets, tables, graphs, charts)

Students will disseminate information and communicate ideas effectively through a variety of technological systems. (Use a wikispace, sharepoint, blog, or other class portal)

Students will select and use both tech products and services and print materials to research, assess, and report appropriate information from a variety of media available in classrooms, libraries, and media centers. (Use databases, simulations, streaming video, and websites (compare org, edu, com, net), web portal use, science news articles, webquests, virtual field trips, and scavenger hunts)

Students will use the tools, materials, procedures, and data available to arrive at multiple solutions to problems. (Choose appropriate tools for study, appropriate applications for showing results of study/testing)

Students will develop and present designs, results, and solutions to a variety of audiences using the appropriate technology. (Use Powerpoint, Excel, Publisher, or Notebook if available)

Make rational decisions about technological issues, and relate the increased use of technological systems to future development. (Trace in each unit the tech developments affecting that particular strand of science and make decisions about their impact)

Using the scientific method in an inquiry based model enables students in grades 6-8 to practice and gain proficiency in the following workplace readiness skills related to critical thinking, decision making and problem solving:

3.1 Recognize and define a problem, or clarify decisions to be made.
3.2 Use models, relationships, and observations to clarify problems and potential solutions.
3.3 Formulate questions and hypotheses.
3.4 Identify and access resources, sources of information, and services in the school and the community.
3.5 Use the library media center as a critical resource for inquiry and assessment of print and non print materials.
3.6 Plan experiments.
3.7 Conduct systematic observations.
3.8 Organize, synthesize, and evaluate information for appropriateness and completeness.
3.9 Identify patterns and investigate relationships.
3.10 Monitor and validate own thinking.
3.11 Identify and evaluate the validity of alternative solutions.
3.12 Interpret and analyze data to draw conclusions.
3.13 Select and apply appropriate solutions to problem-solving and decision-making situations.
3.14 Evaluate the effectiveness of various solutions.
3.15 Apply problem-solving skills to original and creative/design projects.

Student discussion groups, lab configurations, and cooperative group learning events take place in each unit. In addition self assessment and peer review are incorporated in each unit to cover the following career indicators:

4.2 Work cooperatively with others to accomplish a task.
4.3 Evaluate own actions and accomplishments.
4.4 Describe constructive responses to criticism.
4.5 Provide constructive criticism to others.
4.9 Use time efficiently and effectively.
4.10 Apply study skills to expand knowledge and skills.

In each unit, lab safety is reinforced and practiced, infusing the following indicators:
5.1 Explain how common injuries can be prevented.
5.3 Demonstrate principles of safe physical movement.
5.4 Demonstrate safe use of tools and equipment.
5.5 Identify and demonstrate the use of recommended safety and protective devices.
5.6 Identify common hazards and describe methods to correct them.
5.7 Identify and follow safety procedures for laboratory and other hands-on experiences.
5.8 Discuss rules and laws designed to promote safety and health, and their rationale.
5.9 Describe and demonstrate procedures for basic first aid and safety precautions.
| Use of Tools | of scientific investigations and model building. This should include face-to-face and virtual contacts. | scientific investigations and model building. This should include face-to-face and virtual contacts. | This should include face-to-face and virtual contacts.  
• Utilize evidence from reading, labs, and classroom demonstrations to construct and defend arguments. |
|---|---|---|---|
| • Properly use a stop watch, beaker, ruler, graduated cylinder, triple beam balance, and goggles.  
• Demonstrate safety in the classroom and lab facility, including proper implementation of traffic patterns, cooperative learning groups, handling of glassware, and maintaining the environment. | • Properly use a microscope, pipettes, thermometers, barometers, and burners.  
• Handle organisms responsibly and ethically (plants). | • Properly use lens, dissecting tools, burners, hood, gas jets, and simple lab chemicals.  
• Handle organisms responsibly and ethically (plants). |
| Math Skills/ Tech integration | • Given formula, can consistently apply and utilize to support lab results.  
• Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies. | • Identify and apply formulas appropriately for given scenarios.  
• Correctly match formulas to purpose.  
• Use mathematical and computational tools to build conceptual-based models and to pose theories.  
• Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies. | • Utilize formulas consistently and accurately.  
• Utilize formulas to discover unknown variables.  
• Use mathematical and computational tools to build conceptual-based models and to pose theories.  
• Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies. |