RIVERSIDE MIDDLE SCHOOL STEM Action Plan
Draft: Implementation of STEM Action Plan
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1. Big Ideas:
To facilitate the integration of STEM into the school curriculum.

Goals & Objectives:

1. Students will process information like engineers, designers, and problem solvers.

2. Students will identify resources and utilize creativity.

3. Students will improve their ability to:
   a. Think critically and abstractly
   b. Demonstrate imaginative and creative thinking
   c. Comprehend independent reading selections
   d. Work cooperatively & effectively with others
   e. Model ethical and social responsibility
   f. Communicate ideas orally

4. Teachers will work cooperatively across teams and subjects on unified Project Based Instruction (PBI) tasks.

5. Teachers will develop a resource support database inviting community leaders, parents, post-secondary education institutions and business partners into the STEM process ensuring student exposure to an array of career choices and their relationship to STEM.

6. Guidance Counselors will use career programs to administer a pre-assessment for student interests (1st nine weeks) and a post-assessment (2nd nine weeks) to offer comparisons and culminating student decisions after receiving year long STEM exposure.

7. Teachers will develop investigations using the Engineering Design Process:
   a. Identify a Challenge
   b. Explore Ideas
   c. Plan and Develop
   d. Test and Evaluate
   e. Present the Solution
**Timeline:**

In addition to the implementation of the action plan components listed above, PBI will be given to all students on a daily basis with a weekly visit from a support specialist listed in item (5). Grade Level specific plan periods are as follows:

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**7th grade science STEM initiative-----Natural hazards**

1st nine weeks

- Set up and prep other teachers----set up career/parent participation component.

2nd nine weeks

- Students will explore the Natural Hazards of an oil spill and the genetic effects that may occur in the future. Students will create an oil spill environment and design suitable methods to clean the area. (Material & student choice driven)

**Possible Cross-Curricular**

- **Social Studies & Computer Technology:** Compare the affects of the oil spill that took place years prior in Greenville to the spill that took place in the Gulf. Allow students to create graphical depictions of the spill on multiple affected parties/industries.

- **ELA & Technology:** Allow students to create advertisements from the viewpoints of oil spill companies, each explaining their reason to reinvent themselves or acquire business from the company responsible for the spill (persuasive writing.)

3rd nine weeks

- Students will discuss the affects of flash floods and how to appropriately contain water to prevent damage in the future. Students will design and build a dam or lock system that can effectively suppress or slow down the flow of water and explain the implications on human society.

**Possible Cross-Curricular**

- **Social Studies & Computer Technology:** (1) Examine the Roman aqueducts and the Erie Canal. Create a debate atmosphere to take sides of removing or improving their systems.

- **ELA & Technology:** (1) Persuasive speech creation. (2) Letters to FEMA.

4th nine weeks
• Students will examine biospheres and will explain methods to prevent the destruction of an ecosystem. Students will design a self-contained ecosystem that will sustain itself.

**Possible Cross-Curricular**

• **Social Studies & Computer Technology**: (1) Create illustrations. (2) Examine past and present affects of ecosystem destruction.
• **ELA & Technology**: (1) Create an activist environment where plans to stop the destruction of an ecosystem are developed. Allow students to create signs and mission statements of groups responsible for supporting a nurtured ecosystem.

Culminating Incentive:

Students will be required to participate in *Invention Convention* which incorporates the STEM model perfectly.

Enhanced Benefit:

Teachers will establish contact with Clemson University Master Gardner Program participants and others to assist in these efforts.

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**8th grade science STEM initiative----Natural disasters**

1st nine weeks

• Set up and prep other teachers----set up career/parent participation component.

2nd nine weeks

• Students research and discuss effects of earthquakes. Research current earthquake devastations.
• Students work in groups to design an earthquake proof building (contact Clemson University staff from partner database for the following: architectural staff/graduate students and request a shake table)

**Possible Cross-Curricular**

• **Social Studies & Computer Technology**: (1) Research the Current Events, Geographical Surfacing, and Economic Effects of the devastation. (2) Create Before and After Maps using GoogleEarth or other mapping program.
• **ELA & Technology**: (1) Develop letters to/ for not-for-profit agencies to request aid for families. (2) Engage in mock-reporting: create a video interview on-site or with a person affected by the devastation.
3rd nine weeks

- Students research and discuss the effects of hurricanes and beach erosion. Research current hurricane landfalls. Design a structure that will withstand hurricane force winds or a method of preventing beach erosion due to storm surges and flooding.

**Possible Cross-Curricular**

- Social Studies & Computer Technology: (1) Research the Current Events, Compare housing materials used by diverse cultures and socioeconomic groups. (2) Compare decades past, present and imagine the future – discuss these effects in a Round table setting. (3) Create Before and After Maps using GoogleEarth or other mapping program to give an account of the view of Earth from space during the natural disaster.

- ELA & Technology: (1) Compare journal entries to professional letters and emailing to texting. Engage students in creating written dialogue of a telephone operator in receipt of distress calls, emails and text messaging staged directly following the devastation.

4th nine weeks

- Students research causes for sinkholes. Research where sinkholes have occurred and effects of them. Classes will be divided into two groups - ½ class will build and simulate sinkholes and the other ½ will brainstorm ways to detect a possible sinkhole occurrence and design possible methods of shoring up bedrock so they do not occur.

**Possible Cross-Curricular**

- Social Studies: (1) Research the Current Event, discuss the economic effects of the devastation. Compare the costs of this disaster that of different type of natural disaster. Examine the effects on the people, their relocation and the state of the surrounding locations in terms of: population, employment, supply and demand, morale. (2) Compare to a similar event of the past.

- ELA & Technology: (1) Develop minutes from a meeting on any topic related to the subject “Brief intro to Roberts Rules of Order” on the importance of taking accurate minutes (notes – relate to students.) Examples may include: the briefing of local law enforcement, the PTO of a demolished school, the yearning of a religious organization, school group, non-profit entity in the community to facilitate aid, etc. (2) Use the above to create a Public Speaking draft instead. Address the City Council, concerned citizens, etc. Video the results.

Computer Technology: Create an animated simulation of any of the above events that will display:
- A visual of the occurrence in action
- A visual of the occurrence before and the subsequent devastation
- A visual of the occurrence from the view of those on the ground and from a satellite.
Culminating Incentive:

- Teachers will take students on a field trip to Charleston to visit the Earthquake Center to study the effects of seismic activity on land masses and the ocean floor. Teachers will also visit the weather center (NOAH) at the area airport to examine the movement and patterns of weather, creating an extension of learning based on completed PBI during the school year.

Enhanced Benefit:

- Students will be required to participate in *Invention Convention* which incorporates the STEM model perfectly.

**Assessments**

To assess achievement, students will create portfolio each nine weeks using authentic documentation such as notes, journals, diagrams, graphs, and pictures. The guidance counselors will also assess using a pre and post career assessments and rubrics related to STEM activities.

**Resources**

In order to implement the S.T.E.M. action plan the following resources will be used:

1. STEM Resources and Web Site
2. Community & Business Partners as mentors
3. Graduate student mentors
4. Guidance department for career assessments
5. Friends and Relatives of Riverside Middle School students and staff
6. Materials & Additional Resources
   a. Lab materials
   b. Websites:
      1. NASA.gov
      2. ISTE / NETS
      4. sites.google.com/sites/scstem2009
      5. National Research Council
6. National Inventors Hall of Fame

7. Technology Student Association (TSA)

**Learning Experiences**

Overall: Incorporate STEM into the learning environment of Riverside Middle School using the Engineering Design Process. Students will learn the importance of career planning through Guidance Staff during the first nine weeks. One project will be completed the next three nine weeks with subsequent cross curricular relationships in ELA, Social Studies, & Computer Technology to teach students the importance of natural hazards/disasters and preventive measures helpful to society. Students will also enhance their technical skills in graphic animation, web page design, spreadsheet/graph creation and word processing to showcase alternate designs.