NEWTON’S FIRST LAW OF MOTION: INERTIA

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Physical Science
INTRODUCTION

- Isaac Newton developed the First Law of Motion to demonstrate the properties of inertia. In doing so, Newton helped people understand movement and rest.

To illustrate this concept, our team demonstrated Newton’s First Law of Motion for our EMPACTS project.

- **Newton’s First Law of Motion:** An object at rest will remain at rest unless acted on by an unbalanced force. An object in motion continues in motion with the same speed and in the same direction unless acted upon by an unbalanced force. This law is also referred to as the “Law of Inertia.”
PROJECT OVERVIEW

- Through research, observation, experiments, and presentation our team demonstrated Newton’s First Law of Motion, with the specific focus on inertia.

- In demonstrating inertia, our team also explained its properties relating to mass and momentum. With a presentation of three interactive experiments, we exhibited inertia and gave our audience the knowledge to conduct these experiments giving them a chance to explore and understand Newton’s First Law of Motion.
COMMUNITY

- **NWACC Physical Science classroom:** We developed a meaningful, hands-on activity that helped learners of all ages to understand Newton’s First Law of motion.

- **Public Elementary science curriculum:** We presented our project to a 4th grade classroom allowing them to experience a visual demonstration of inertia. We also developed a lesson plan which is included in a collection of student work on the EAST Lab web pages to be shared with Pre-service K-8 teachers in our class, in future classes, and others who access the NWACC East Lab web pages.

- Our **community contacts** and **collaborators** were our Physical Science instructor C. Dianne Phillips, Ms. Many at RE Baker elementary school, as well as all of the students in our Physical Science classroom.
CURRICULUM

Our goal to gain a foundation of knowledge about Physical Science was met. Learning about Newton’s First Law of Motion benefited our learning and understanding of an important property involved in science.

Our team followed the following objectives stated in our course syllabus:

- Demonstrate the scientific method and principles by conducting an experiment, collecting and analyzing data, and interpreting results.
- Recognize the implications of science in making choices on personal, community and global issues.
- Identify unifying principles and repeatable patterns in the physical world and apply them to problems or issues of a scientific nature.
Our EMPACTS project met the course objectives in the following ways:

- Through the use of the scientific method, we researched, built, tested, and presented our projects for use in our video and demonstrations. We interpreted the results within our written report.

- By understanding and reiterating that understanding of inertia, we demonstrated our perception that science is important in personal, community, and global issues as Newton’s First Law of Motion is a fundamental property of science.

- We unified principles and repeatable patterns within our physical world by showing our audience how inertia works. Our project was all composed in a scientific nature.
We met the following strand and section of the Arkansas Public Education Frameworks

- Strand 3: Physical Science
  - Standard 6: Motion and Forces:
    - Students shall demonstrate and apply knowledge of motion and forces using appropriate safety procedures, equipment, and technology.

- PS.6.7.2
  - Conduct investigations demonstrating Newton’s first law of motion
TECHNOLOGY

- We used the following technology and resources for our project:
SKILLS DEVELOPED

As a team we developed the following skills:

- Communication
- Responsibility
- Learned to organize our research.
- Established appropriate leadership.
- Understood and appreciated the concept of teamwork.
- Learned to cooperate as much as possible.
- Integrated our individual thoughts into one collaborative project.
**Methodology**

- **Process:**
  - To complete our project, our process entailed:
    - Establish multiple meetings to coordinate our experiments and organize our responsibilities.
    - Developed group networking and web research.
    - Developed a complete list of materials, divided labor, and composed our three projects.
**Methodology: Time Line**

- **Mon., November 8**<sup>th</sup> the team assembled to refine the EMPACTS proposal and present a PowerPoint on Newton’s 1<sup>st</sup> Law and Momentum.
- **Wed., November 10**<sup>th</sup> the team will checked the materials list and assigned the materials that each individual team member is responsible for. Team also developed a time frame for completion of inertia ramp. Team will also established a date to test experiments.
- **Mon., November 15**<sup>th</sup>, the team will completed all necessary assembly of projects and continued to test. The team will discussed the development of a lesson plan to fit the Arkansas Frameworks.
- **Mon., Nov 29**<sup>th</sup> - Cathy took the digital picture and recording camera for Inertia Presentation 4th Grade RE Baker class (shown on the 30th). Cathy did an Egg drop and Marble roll presentation for the class. She filmed and took pictures and brought them to class Wednesday. Rene brought her laptop and uploaded pictures and video to start initial editing.
- **Wed., Dec 1**<sup>st</sup> - Christy took camera home for the Linear Inertia Ramp demonstration at home with her children. Christy filmed and took pictures and brought camera to Rene on FRIDAY the 3rd. At home Rene worked on filming introduction and conclusion. Rene edited all videos together and uploaded on YouTube as well as embedded it in PowerPoint.
- **Mon., Dec 6**<sup>th</sup> - Rene continued to work on editing video and composing PowerPoint together. Christy and Cathy continued to work on Lesson Plan and Activity to be ready for Wednesday’s class.
- **Wed., Dec 8**<sup>th</sup> - Rene will came to class with both power points done and video edited together (this video was embedded into our EMPACTS PowerPoint). We also had lesson plan completed as PDF file. As a group, we made sure all of the components of our East Lab project were accounted for and that our project is 100% complete. Everyone will brought projects from home for quick demo to the classroom. We showed short clips of our video of what we had done and we took pictures of the classroom with our projects. Pictures will were then amended to the final PowerPoint.
- **Fri., Dec 10**<sup>th</sup> – EMPACTS presentations due.
**Methodology – Division of Labor**

- **Personnel**
  - **René Ornelas-Young**
    - René was responsible for research of information and projects along with Cathy and Christy. René composed the EMPACTS PowerPoint and with assistance from the team, an informational PowerPoint on Inertia. René completed an introduction and conclusion as well as some narration to our video and edited all project videos together. René produced and organized the final video. René also finished our group EMPACTS report, organized the timeline, and kept up on progress.
  - **Cathy Zehnder**
    - Cathy, along with Christy and René, developed ideas through research for our projects. Cathy was in charge of the Marble on a Track project to demonstrate momentum as well as the Egg Drop project to demonstrate inertia. Cathy was in charge of ensuring that the projects were constructed properly and tested the projects to ensure a successful demonstration. Cathy took project to a 4th grade class and demonstrated it. Cathy filmed her project. Cathy also composed a lesson plan for Inertia.
  - **Christy DelosSantos**
    - Christy, along with Cathy and René, developed ideas through research for our projects. Christy was in charge of the Marble Ramp to demonstrate the mass and force properties of inertia. Christy was in charge of making sure that the ramp was constructed properly and tested it to ensure a successful demonstration. Christy presented the ramp project to her school aged children. Christy also wrote the activities to our project to be included with the lesson plan.
PRODUCTS

- **Lesson Plan with Activity**
  - has been made available by our website to other students and teachers.

- **Informational Power Point**
  - completed and available for other teachers and students to use.

- **Final EMPACTS Project Power Point**
  - completed and uploaded onto webpage.

- **Webpage**
  - provided by C. Dianne Phillips under the EAST lab website. Pictures and videos of demonstrations made available to anyone who accesses webpage.

- **Video of our EMPACTS Project experience**
  - Uploaded to webpage.
ACKNOWLEDGEMENTS

- Ms. Many – 4th grade teacher at RE Baker Elementary
- Ms. Phillips – NWACC Physical Science instructor.

References:
- [http://www.stevespanglerscience.com/content/experiment/00000084](http://www.stevespanglerscience.com/content/experiment/00000084)
- [http://www.spartechsoftware.com/reeko/experiments/momentum.htm](http://www.spartechsoftware.com/reeko/experiments/momentum.htm)