STEM Collaborative Cataloging Project

Aero Viz Wind Tunnel Lesson Plan

Context (InTASC 1,2,3)

Lesson Plan Created By: Alyssa Horpedahl
Created:
Lesson Topic: Aerodynamics
Grade Level: Grades 6-7
Duration: 2 or 3- 50 minute class periods
Kit Contents: http://odin-primo.hosted.exlibrisgroup.com/nmy:nmy_all:ODIN_ALEPH007831120

Desired Results (InTASC 4)

Purpose: The purpose for this lesson is to give kids real life experience with aerodynamics and car design.

North Dakota Science Content Standards:

- Science Standards: Engineering Design
  - ETS.1.4 (Middle School) 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.
  - MP.2 (Middle School) Reason abstractly and quantitatively.

Objectives:

1. The student will be able to design and build an air-powered car that has good aerodynamics for racing.
2. The student will be able to redesign their car to improve its performance.

Assessment Evidence (InTASC 6)

Evidence of meeting desired results: The student's car will be evidence of their learning. The car should do well in the wind tunnel test as well as the racing test.

Learning Plan (InTASC 4,5,7,8)

Instructional Strategy: (Check all that apply)

☐ Direct ☑ Indirect ☑ Independent ☑ Experiential ☑ Interactive

Technology Use(s): (Check all that apply)

☑ Student Interaction ☐ Align Goals ☐ Differentiate Instruction ☑ Enhance Lesson

☐ Collect Data ☐ N/A

Hook and Hold:

- Run your pre-made AP Dragster once to hook the students and get them excited to be creating their own. Also demonstrate the Aero Viz Wind Tunnel to get them thinking about their car's aerodynamics. Discuss aerodynamics – the definition and what it means for cars, airplanes, trains, etc.

Materials:

- Aero Viz Wind Tunnel
- AP Dragster Designer Kit (not included)
- AP Dragster launcher (not included)
- ActiveBoard
- Projector w/sound
- Wood tools
- Sandpaper

Procedures:

1. Go through any safety expectations/rules you may have because the students will be working with woodworking tools and sandpaper.
2. Put students in teams or let them work individually (depending on how many AP dragster kits you have).
3. Explain the steps of the Engineering Design Process:
   1. Identify the problem
   2. Identify the criteria and constraints
   3. Brainstorm possible solutions
   4. Select an approach
   5. Build a model
   6. Test your solution
   7. Test your solution
   8. Communicate results
   9. Refine the design
4. Let them know the problem: You have been challenged to an AP Dragster race and wind tunnel test by your teacher.
5. Explain your criteria & constraints for their dragster project: Things you may want to include would be tools allowed in the making of their dragster, time limits, etc. Use the Active Board for these.
6. Explain that the next step in the EDP is to brainstorm possible solutions. Have students sketch out 2-3 design ideas they have for their AP Dragster.
7. The next step in the EDP is to choose the best solution. So at this point the students would join their partner/group (if applicable) to decide on their design.
8. Students are now ready to build their model. Remind them of their criteria and constraints.
9. Once their basis body design is complete have them test their idea in the wind tunnel. After the wind tunnel test they may tweak their design to be more aerodynamic. They must then finish up their car so it is ready for racing.
10. Hold student races as they finish. This will most likely occur on the 2nd or 3rd day of class.
11. Have students document their work through this project. They will be responsible for communicating their results with the class through a presentation medium of the teacher's choosing (ex. Prezi, Google Docs, Canva, etc.) using the projector and sound, as well as active board.

Summary: The last step in the EDP is to rethink your design. Have students explain any changes they would make to their AP car and why. Make sure they know they are to include the word aerodynamic in their explanation!

Reflection (InTASC 9)

Reflect On:

- *Preparation*
- *Planning*
- *Teaching*
- *Student Engagement and Participation*
- *Evidence of Student Learning*

Standards

Council of Chief School Officers. (2011, April) *Interstate Teacher Assessment and Support Consortium (InTASC) model core teaching standards: a resource for state dialogue*. Washington DC. Retrieved from http://www.ccsso.org/documents/2011/intasc_model_core_teaching_standards_2011.pdf

North Dakota Department of Public Instruction. (2011) *North Dakota Science content standards.* Bismarck, ND. Retrieved from https://www.nd.gov/dpi/uploads/132/NDScienceStandardsDraftFormat2_MSETS.pdf

This project was made possible in part by the Institute of Museum and Library Services. [SP-02-15-0044-15]