

Leslie Armstrong



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Leslie Armstrong: Air Up There Parachute Challenge

I am currently a STEM specialist at Laura S. Ward STEM Elementary School located in Chicago, IL. Educating students at Laura S. Ward has been my passion for over 18 years. As a STEM specialist, my professional duties include assisting with implementating the STEM framework into the curricular backbone of the school. This work in progress has been realized by developing a school-wide team of teachers, providing professional development for parents and teachers, developing partnerships with universities and businesses, and creating opportunities for external STEM experiences for students and parents. During these formative years I have went from a novice educator to a teacher leader. As a result of this transformation, I am presently seeking to advance my educational portfolio by participating in the University Of Michigan's STEM Technology Certification Cohort. Upon completion of this course work, I have decided to obtain a Type 75 school leadership; with a masters in school administration. Envisioning a new platform for the improvement of educating children, parents and teachers has awakened my inner being of becoming an educational activist. Our future depends on the work we do now.

Air Up There Parachute Challenge

Grade Level: Grades 3-5

Content Area Topic: Science

Unit Design:

This unit, from which this lesson is derived, is designed to introduce students to the composition of matter and its phases. Students will also learn that the behavior of matter affects other material objects. Students will study and model prototypes of apparatus that utilize air for motion. This unit can be adjusted to meet the needs of students in Pre-K -5. The duration of the implementation of this unit is 2-5 days per phase.

Content Area Standard(s):

- 3-5-ETS1-2.: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- 3-5-ETS1-1.: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-3.: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

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Learning Objective(s):

Students will be able to demonstrate their understanding of air resistance by designing a prototype of a parachute
Students will gather and analyze data using precision tools
Connect content of lesson to a literary concept

Suggested Time Allotment: 60 Minutes

Sequence in Learning:

Preceding Lesson and activities:

- Backwards movement from matter to the atom
- Design challenge modeling 2 and 3 dimensional representations of molecular movements

Post Lessons Sequencing:

The lessons that follow the parachute challenge are focused on the principle of designing and testing models of apparatus that utilize air for motion. The designs are based on available materials and range of student abilities

Design challenges:

- Design a functional prototype of a hovercraft
- Design a balloon car that can travel the furthest distance
- Comparing densities of matter with the force of air
- Design an airbag that reduces the amount of passenger recoil

Materials & Resources Needed:

<i>Materials</i>	<i>Media Resources</i>
<p><i>Class Set (Approximately 20-36 Students)</i></p> <ul style="list-style-type: none"> • 1 box of facial tissue • 100 colored adhesive dots • 1 large box of jumbo paper clips (100 ct. box) • 36 feet of white string • 18 school scissors • 36 sheets of tissue paper • 36 feet of yarn • 50 paper lunch bags • 36 science journals • 18 small reels of masking tape 	<ul style="list-style-type: none"> • History http://www.youtube.com/watch?v=mfZu4fzryIY • <i>Gravity</i> http://www.youtube.com/watch?v=y0SEzLv6Tgo • How parachutes work http://www.youtube.com/watch?v=S1pyZlzfAD0 • How parachutes work http://www.youtube.com/watch?v=S6aJ9DSYOHk • Online stopwatch http://www.online-stopwatch.com/ • <i>Diving</i> http://www.cbsnews.com/videos/george-h-w-bush-goes-skydiving-for-his-birthday • Explanation of Relationship between parachute jumping and air resistance http://www.youtube.com/watch?v=vZYwsAvHgVw • Air Up There https://docs.google.com/a/cps.edu/presentation/d/1COI71JoEHycA6S3dwustliRtHOAgsoczI8WRqoUDMMQ/edit?usp=sharing • Air Up There https://docs.google.com/a/cps.edu/presentation/d/1COI71JoEHycA6S3dwustliRtHOAgsoczI8WRqoUDMMQ/
<p><i>Materials Per Pair</i></p> <ul style="list-style-type: none"> • 2 facial tissues • 2 paper clips • 4 colored adhesive dots • 2 feet of string • 2 feet of yarn • 1 sheet of tissue paper • 1 paper bag • 1 reel of masking • 2 science journals 	



Lesson Activities & Sequence:

- Prior to the execution of this lesson, students have been engaged in lessons and activities that focused on the makeup of matter and modeling the components of matter. Teachers should also have grouped students into academic ,heterogeneous, cooperative groups of quads. (See Air Up There “Parachute Challenge “ Slide 15) .
- The teacher should also introduce or reintroduce symbolic language of lessons guide. (See Air Up There “Parachute Challenge “ Slide 4) The purpose of utilizing these symbols is to provide visual cues and references for diverse learners. (5 minutes for symbol decoding)

Engagement (10 mins):

The lesson opened with the teacher showing an image of a parachute to survey students’ ability to identify this object and to spark interest. (See Air Up There “Parachute Challenge “ Slide 5) The next stage of engagement involves the completion of a KWN chart. (See Air Up There “Parachute Challenge Slide 6) The purpose of this activity is to infuse cooperative thinking, discussion and writing within the lesson framework. The **K** column of the chart allows the teacher to gather data about students’ background knowledge. The **W** column provides the opportunity for students to make independent determinations of what their needs are to further their understanding about this subject. The **N** column empowers to complete a brief educational plan of action to further their learning.

Engagement II (5 mins):

The second phase of the engagement process involves a cross curricular connection to character analysis. Students are asked to worked cooperatively to identify traits that they consider an individual has in order to sky dive. (See Slide 7)

A classroom debriefing followed this activity. The debriefing will occur in an open forum; where students share responses as the teacher posts responses digitally or traditionally. As a real world connection, the teacher will correlate this activity to showing students a video about a president who skydives for his birthday. (See Media Resource Section)

Explain (10 mins):

In this process the learner will begin by making a hypothesis about how a parachute operates and make connections to the goal of engineering; to make human lives better. Students will participate in a cooperative think, discuss & write format to complete this task. The think, discuss & write process provides a format for students to safely exchange ideas verbally and in written form. Students will view a video that provides an explanation of how parachutes operate. (See media resource) Media sources provide an additional level of support for visual learners and our diverse student population. The teacher will pause to clarify content through discussion and questioning. At the conclusion of the video, students will confirm whether their hypothesis has been confirmed or disproved.

Explore (15 mins):

In this phase of the lesson, students will work in cooperative groups to design a prototype of a parachute that has the most air resistance. The teacher will use a detailed flow chart to introduce, purpose, process and criteria. Students will then be directed to explore materials and discuss materials selections collaboratively. Before students begin assembling their parachutes they must complete a sketch. Students will be given 15 minutes to create parachutes and input data into their charts. At the conclusions of this phase, student pairs will compare the performances of their parachutes to determine which prototype has the most air resistance.

<i>Trial</i>	<i>Time Seconds of Drop From 3 Meters</i>
1	
2	
3	
4	
5	
6	
7	
8	

Reflection (10 mins):

A key portion of the inquiry process is the practice of reflection for next direction. In this process, students reflect on key questions:

What materials did you use to construct your parachute?	Explain how the selection of the materials effected the operation of your parachute.
What steps would you take to improve your model?	Provide one example of how this lesson can be improved?

Students must initially begin completing this reflective organizer independently and begin collaborative conversations and scribing after 5 minutes. To insure that students from the diverse populations are successful at completing this portion, the format can be adjusted to interview, scribe.

Extension (5 mins):

At the conclusion of the lesson students will be instructed to revisit the W and N columns of graphic organizers to and identify one idea that they would like to explore further They will present new findings in a creative and exciting way. Examples: compose a rap or a song, create a video, interview a primary or secondary source, use mixed media. The teacher will present rubric and timetable at the next class session

Proficiency: (Complete Next Class Session)

In order to provide a standard of continued growth in student achievement and teaching pedagogy, a rubric provides a lens of structured tasks that supports the growth and reflective process. The evaluative criteria have a direct connection to the standards and objectives that were embedded in this lesson. The teacher should meet with each pair of students to review their performance and should be combined with the student commentary in their reflective journals.

<i>Advanced 4</i>	<i>Proficient 3</i>	<i>Emerging 2</i>
Appropriate materials were selected, an ample attempt was made to transform materials into a prototype that led to effective operation	Appropriate materials were selected, a moderate attempt was made to transform materials into a prototype that led to moderate operation	Inappropriate materials were selected, an moderate attempt was made to transform materials into a prototype that led to ineffective operation
Journal entry contained a detailed sketch, evidence of modifications and several data entries	Journal entry contained a detailed sketch, evidence of some modifications and 4 data entries	Journal entry contained a moderate sketch, evidence of some modifications and 3 data entries

Feedback

Elements of Pretty Good Practice:

- Appealed to diverse learners: Kinesthetic, visual, interpersonal
- Transitions were flawless
- Visuals: Organized ppt
- Visuals and auditory cues
- Unit is scaffolded nicely
- Activate prior knowledge through graphic organizer
- Evidence of thorough planning
- Inquiry based
- Integrated writing speaking standards

Modifications and Adaptations:

The following recommendations were suggested by my colleagues improve the quality of my lesson :

- Vocabulary-Concept maps (air resistance and gravity)
- Pictorial representations of instructions
- Graphing the time for each drop (Math Connection)
- Link layers of the atmosphere to this lesson
- Integrate literacy such as “Humpty Dumpty”

After reflecting on the lesson, I would recommend that I should have included the use of technological devices such as ipads to aid students in capturing their responses to questions and providing a resource to review processes.

Questions Arisen:

- How can additional sources of technology be utilized to enhance the lesson?
- How can the other content areas be integrated into this lesson?